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BERGER ASSOCIATES INC HARRISBURG PA

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NATIONAL DAM INSPECTION PROGRAM. WHITE OAK POND DAM (NDI NUMBER--ETC(U)

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DACW31-80-C-0019

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6 National Dam Inspection Program.
White Oak Pond Dam (NDI Number
PA-00147, DER Number 64-12),
Delaware River Basin, Wayne
County, Pennsylvania. Phase I
Inspection Report. ~~REDACTED~~

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MAR 11 1980

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

11 Jan 80 12 75
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

15 DACW 31-80-C-0019
It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam: WHITE OAK POND, NDI NO. PA-00147
State & State No.: PENNSYLVANIA, 64-12
County: WAYNE
Stream: TRIBUTARY OF WEST BRANCH LACKAWAXEN RIVER
Date of Inspection: October 24, 1979

DACW31-80-C-0019

Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in good condition.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is intermediate and the hazard classification is high. The spillway capacity combined with the available storage is sufficient to pass the PMF (Probable Maximum Flood) peak inflow without overtopping the dam. The spillway is therefore considered to be adequate. These calculations are based on a maximum stoplog elevation of 11.7 feet above the wetwell floor.

The following recommendations are presented for immediate action by the owner:

1. That the emergency spillway in the left abutment be cleared of all brush and trees and that this maintenance be performed on a regular schedule.
2. That the slab and walls of the emergency spillway be restored to a structurally adequate condition.
3. That the upstream end of the outlet tunnel be inspected for possible obstructions.
4. That the downstream section of the outlet conduit be inspected on an annual basis for possible deterioration of the concrete floor.

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5. That a formal surveillance and downstream warning system be developed to be used during periods of heavy or prolonged precipitation.
6. That a program be developed for regular inspection and maintenance.

SUBMITTED BY:

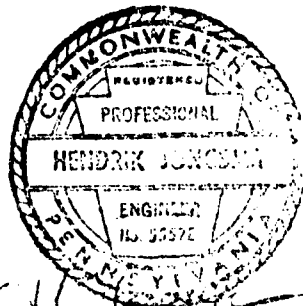
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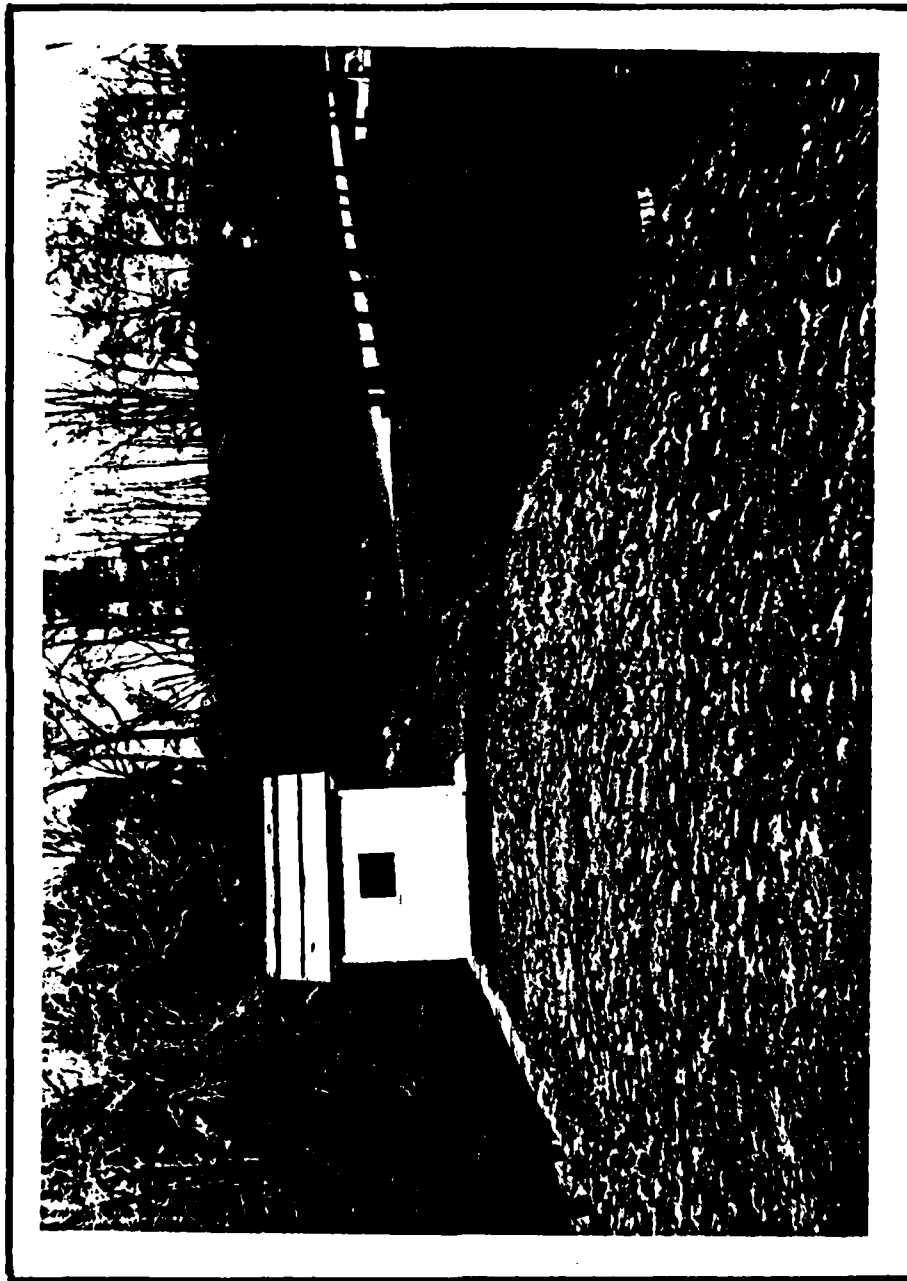
DATE: January 25, 1980

APPROVED BY:

James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

DATE 25 Feb 1980





OVERVIEW

WHITE OAK POND DAM

Photograph No. 1

TABLE OF CONTENTS

	<u>Page</u>
SECTION 1 - <u>PROJECT INFORMATION</u>	
1.1 GENERAL	1
1.2 DESCRIPTION OF PROJECT	1
1.3 PERTINENT DATA	2
SECTION 2 - <u>ENGINEERING DATA</u>	
2.1 DESIGN	5
2.2 CONSTRUCTION	5
2.3 OPERATION	5
2.4 EVALUATION	5
SECTION 3 - <u>VISUAL INSPECTION</u>	
3.1 FINDINGS	7
3.2 EVALUATION	8
SECTION 4 - <u>OPERATIONAL PROCEDURES</u>	
4.1 PROCEDURES	9
4.2 MAINTENANCE OF DAM	9
4.3 MAINTENANCE OF OPERATING FACILITIES	9
4.4 WARNING SYSTEM	9
4.5 EVALUATION	9
SECTION 5 - <u>HYDROLOGY/HYDRAULICS</u>	
5.1 EVALUATION OF FEATURES	10
SECTION 6 - <u>STRUCTURAL STABILITY</u>	
6.1 EVALUATION OF STRUCTURAL STABILITY	12
SECTION 7 - <u>ASSESSMENT AND RECOMMENDATIONS</u>	
7.1 DAM ASSESSMENT	14
7.2 RECOMMENDATIONS	14
 APPENDIX A - CHECK LIST OF VISUAL INSPECTION REPORT	
APPENDIX B - CHECK LIST OF ENGINEERING DATA	
APPENDIX C - PHOTOGRAPHS	
APPENDIX D - HYDROLOGY AND HYDRAULIC CALCULATIONS	
APPENDIX E - PLATES	
APPENDIX F - GEOLOGIC REPORT	

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

WHITE OAK POND DAM

NDI-ID NO. PA-00147

DER-ID NO. 64-12

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B. Purpose

The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

Note: Project datum elevation is not available. The reservoir pool elevation of 1366, shown on the U.S.G.S. Quadrangle Sheet is assumed to be normal pool elevation at top of stoplogs.

White Oak Pond Dam consists of an earthfill embankment with a nearly vertical handlaid dry stone wall on the downstream side. The length of the embankment is about 300 feet with a slight curve at its right abutment. The maximum fill height is 26 feet above the original streambed. The facility has two spillways. The major outlet is located near the center of the embankment length and consists of a wetwell with stoplogs on the centerline of the dam axis. Normal pool is about 14 feet below the crest of dam. A concrete arch conduit connects the wetwell with the reservoir and the downstream channel. An emergency spillway is located in the left abutment with a weir elevation at 7 feet below the top of the dam.

B. Location:

Clinton Township, Wayne County
U.S.G.S. Quadrangle - Forrest City, PA
Latitude 41°-38.7', Longitude 75°-22.6'
Appendix E, Plates I & II

- C. Size Classification: Intermediate: (Height 26 feet
Storage 5868 acre-feet)
- D. Hazard Classification: High (Refer to Section 3.1.E)
- E. Ownership: Pennsylvania Fish Commission
P.O. Box 1673
Harrisburg, PA 17105
- F. Purpose: Public Fishing
- G. Design and Construction History

According to a report prepared by the Pennsylvania Water Supply Commission dated May 17, 1917, the dam was constructed around 1830 by the Delaware & Hudson Canal Company. The stored water was used to feed their canal system. Deeds indicate that inundation rights were transferred to Delaware & Hudson Company in 1845. The canal and its water supply were abandoned in about 1890. The reservoir was drained and the original wooden gate subsequently deteriorated. The structure was rehabilitated by its present owner in the twenties and the stoplog structure and upstream conduit were repaired in 1939 (Appendix E, Plate V).

H. Normal Operating Procedures

The reservoir is used for public fishing and the pool level is maintained at normal spillway elevation. All inflow above this level is discharged over the stoplogs.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files:	4.2
Computed for this report:	3.8
Use:	3.8

B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations

Maximum known flood, May 1942	186
Outlet works low-pool outlet at pool Elev. 1366, top of stoplogs	None
Stoplog structure at Elev. 1373.6 (Emergency Spillway)	335

Stoplog structure at Elev. 1380.4 (Top of Dam)	620
Emergency spillway capacity at pool Elev. 1380.4 (top of dam)	512
Total discharge capacity	1132
D. <u>Elevation</u> (feet above mean sea level)	
Top of dam (low point)	1380.4
Emergency spillway	1373.6
Spillway crest (stoplogs)	1366.0
Upstream portal invert	1354.3
Downstream portal invert	1354.3
Streambed at centerline of dam - estimate	1354.3
D. <u>Reservoir</u> (miles)	
Length of normal pool	.9
Length of maximum pool	1.1
E. <u>Storage</u> (acre-feet)	
Top of stoplogs (Elev. 1366.0)	1694
Top of dam (Elev. 1380.4)	5868
F. <u>Reservoir Surface</u> (acres)	
Top of dam (Elev. 1380.4)	361
Top of stoplogs (Elev. 1366)	223
G. <u>Dam</u>	
Refer to Plate III in Appendix E for plan, and Plate A-III, Appendix A for section.	
Type: Earth embankment with nearly vertical downstream dry stone wall.	
Length: 300 feet.	

Height: 26 feet.

Top Width: 22 feet.

Side Slopes: Upstream - 1.67H to 1V
Downstream - 1H to 4V

Zoning: None.

Cutoff: None reported.

Grouting: None reported.

H. Outlet Facilities

None.

I. Spillway

Type: Uncontrolled broad-crested weir (stoplogs).

Length: 5 feet.

Crest elevation: 1366.

Location: Wetwell near center of dam.

Upstream channel: Arched tunnel under embankment.

Downstream channel: Rectangular tunnel under embankment.

J. Emergency Spillway

Type: Uncontrolled broad-crested weir, rock lined.

Length: 11 feet.

Crest elevation: 1373.6.

Location: Right abutment.

Downstream channel: Rock lined rectangular channel.

K. Regulating Outlets

Stoplogs (See 1.3.I).

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Design data for White Oak Pond does not exist in the files of the Pennsylvania Department of Environmental Resources (PennDER). The files of the owner contained three drawings. A 1"=200' scale drawing has a general plan of the reservoir showing the properties of the original owners and the date of deed transfers. This drawing also has a table indicating the storage capacity of the reservoir. The second drawing indicates repairs made to the facilities by the Pennsylvania Fish Commission around 1928, when a downstream catch-basin was added. Parts of these drawings have been retraced on Plates III and IV in Appendix E. The last drawing is reproduced as Plate V, Appendix E and is dated 1939.

2.2 CONSTRUCTION

Records of construction of the original dam are not available.

2.3 OPERATION

Records of operation are not maintained. A letter from the Pennsylvania Fish Commission states that the maximum depth of flow over the stoplogs recorded during the flood of May 22, 1942 was 5 feet above the stoplogs or 12 feet above bottom of wetwell. The top of the stoplogs was at 7 feet at that time.

2.4 EVALUATION

Reports by the Pennsylvania Water Supply Commission indicate that the reservoir was drained around 1890 and not in use until the Fish Commission rehabilitated the structure. In October 1928 it was reported that: "The dam is overgrown with trees and brush. The downstream wall has bulged at the top and bottom in places and has collapsed at several points." The report also states that the sluiceway is in fair condition, all wood supports had rotted and that the spillway in the left abutment had deteriorated badly.

2.4 EVALUATION

A. Availability

Engineering and construction data for this dam is very limited. The files of PennDER contain two reports dated 1917 and 1928 describing the condition of the structure at times when the reservoir was drained. The available drawings are in the files of the owner.

B. Adequacy

The evaluation of the safety of this dam has to be based on visual inspection only. A review of design data is not possible.

C. Operating Records

Operating records have not been maintained.

D. Post Construction Changes

The only recorded modifications are changes to the sluiceway and the wetwell. The upstream conduit intake was changed from masonry to a concrete arch in 1939 and a new support for stoplogs was added in that same year.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of the dam at White Oak Pond is good. The emergency spillway, however, needs maintenance and repair. The reservoir and dam are owned by the Pennsylvania Fish Commission and are used by the general public for fishing. The dam consists of an earth-fill embankment with a downstream handlaid dry stone wall and a sluiceway controlled with stoplogs. An emergency spillway is located in the left abutment. Mr. Jon Grindall, P.E., and Mr. Charles Rupert represented the owners and accompanied the inspectors during the field inspection.

The visual inspection check list is presented in Appendix A of this report. This appendix also contains a general plan (schematic) of the dam and a profile based on survey information obtained during this inspection. Photographs are reproduced in Appendix C.

B. Embankment

The dam was constructed along a horizontal curve. The alignment appeared to be good along this curve. The upstream slope is rather steep, but no slope failures were detected. Riprap is present near the entrance to the underwater intake to the wetwell. Some brush was on the upstream slope. This growth should be controlled by regular cutting. Trees growing near the left abutment are not considered a danger to the structure due to the width of the dam breast at this point and the relatively flat slopes.

The breast of the dam is curved and is covered with a well maintained grass mat. The profile indicates a fairly level surface (Plate A-II). A wooden framed shed is located on the embankment over the wetwell. The downstream slope has a slightly battered wall formed with loose handlaid stone. This wall projects about nine feet downstream over the outlet structure. Although most of its surface was smooth and in one plane, a small area at the bottom of the wall bulges on both sides of the outlet structure. These "bulges" appear to be part of the original construction. It appears that the wall was built slightly wider at these locations, due to its height.

C. Appurtenant Structures

The main discharge facility is located in the center of the dam and is controlled with stoplogs. An underwater culvert brings the water to a wetwell. The headwall of the culvert is concrete, most of which is submerged. As a result, the condition of the culvert could not

be inspected. However, probing at the underwater entrance revealed an object of unknown size located about 5 feet beneath the water surface directly in front of the entrance to the culvert. This object could restrict flow through the culvert. The pool level is controlled with stoplogs which fit in a groove formed by steel angles and concrete against the old stone walls. The water flows over the stoplogs in the other half of the well and from there through a culvert underneath the wall to the downstream channel. The outside stone wall appears to be in good condition, but due to the flow of water, the culvert could not be inspected. The water falling over a height of 12 feet without a drop bucket could cause erosion of the floor. Water was leaking through the stoplogs and flowing over the stoplogs at the time of inspection. It appeared that some water was leaking through the stone adjacent to the stoplog groove.

An emergency spillway is located in the left abutment of the embankment. This broadcrested spillway is constructed of stone and has a U-shaped channel with stone walls. A considerable amount of debris, brush and trees are clogging the upstream end, and the walls in this area are in need of repair. The discharge channel beyond the center line of the dam is in better condition and is well defined between low masonry walls.

D. Reservoir Area

The reservoir area is mostly surrounded by woodlands and the slopes appear to be stable. Significant sedimentation has not been reported.

E. Downstream Channel

At the exit of the discharge conduit under the wall, a concrete catch basin has been constructed for fish management purposes. Openings in this basin let the water flow through its original streambed. Just below the basin, the stream flows through a culvert under a township road. The culvert has a nearly square section (60 inch x 74 inch high) at its entrance then changes about half way under the roadway to a circular 78-inch pipe. About four thousand feet below the dam, the creek joins the West Branch of Lackawaxen River near the village of Aldenville. At least 10 homes are located in the floodplain. Therefore, the hazard category is considered to be "High."

3.2 EVALUATION

The overall visual evaluation for these facilities indicates that the structure is in good condition. It is recommended that the outlet tunnel be inspected by a diver or when the pool level is low and that the emergency spillway be cleared and repaired.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The operational procedures for White Oak Dam are limited and consist of embankment maintenance and adjusting stoplogs as required for fish management. The stoplogs are maintained at normal pool level, Elev. 1366.0, except in spring time when the reservoir generally is lowered about 1.5 feet. All inflow is discharged through the wetwell over the stoplogs.

4.2 MAINTENANCE OF DAM

Although some brush cutting is required on the upstream slope, the embankment is generally in good condition. The breast of the dam has a good appearance while the downstream handlaid dry stone wall does not need any maintenance, except the removal of brush and trees along the toe of the wall.

4.3 MAINTENANCE OF OPERATING FACILITIES

The emergency spillway has not been maintained to ensure its operating condition in case of an emergency due to heavy inflow. Cleaning of the debris in the entrance and repair of the walls are necessary items.

The wetwell, stoplogs and outlet conduit appear to be in good condition. It is recommended that a yearly inspection program be instituted to review the condition of the area where the water falls down over the stoplogs.

4.4 WARNING SYSTEM

Mr. Jon Grindall, of the Pennsylvania Fish Commission, stated that his office is preparing an Operations & Maintenance Manual for these facilities. This manual will address the requirements for surveillance and a downstream warning system.

4.5 EVALUATION

The operational and maintenance procedures for these facilities appear to be adequate, with the exception of the maintenance of the emergency spillway. An annual inspection of the outlet conduit is recommended. A formal surveillance and a downstream warning system should be developed for implementation during periods of high or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

Very little information was available on the hydrologic and hydraulic design of the dam. There were no area-capacity curves, frequency curves, unit hydrographs, design storm data, design flood hydrographs, flood routings nor spillway rating curves.

B. Experience Data

The maximum known flood at White Oak Pond occurred in May 1942 when the water level in the lake rose 5 feet above normal. This storm was passed without damage.

C. Visual Observations

At the time of the inspection an undefined object was discovered by probing at the entrance to the outlet tunnel. This object could be blocking flow through the outlet tunnel. Trees and brush were growing at the upstream end of the emergency spillway and could restrict flow through the spillway.

D. Overtopping Potential

White Oak Pond Dam has a total storage capacity of 5868 acre-feet and an overall height of 26 feet above streambed, both referenced to the top of the dam. These dimensions indicate a size classification of "Intermediate". The hazard classification is "High" (See Section 3.1.E).

The recommended Spillway Design Flood (SDF) for a dam having the above classifications is the Probable Maximum Flood (PMF). For this dam, the PMF peak inflow is 7326 cfs (see Appendix D for HEC-1 inflow computations).

Comparison of the estimated PMF peak inflow of 7326 cfs with the estimated total spillway discharge capacity for both spillways of 1132 cfs indicates that a potential for overtopping of the White Oak Pond Dam exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam has the necessary storage available to pass the PMF without overtopping.

E. Spillway Adequacy

The intermediate size category and high hazard category, in accordance with the Corps of Engineers criteria and guidelines, indicates that the Spillway Design Flood (SDF) for this dam should be the Probable Maximum Flood (PMF).

The calculations show that the spillway discharge capacity and reservoir storage capacity combine to handle 100% of the PMF with about 1.6 feet of freeboard (refer to Sheet 6, Appendix D).

Since the spillway discharge and reservoir storage capacity can pass the full PMF without overtopping the dam, the spillway is considered to be adequate. This conclusion is based on the present condition with stoplogs placed to an elevation of 1366.0 (11.7 above bottom of wetwell).

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Embankment

The typical section of White Oak Pond Dam consists of an upstream embankment with a downstream, handlaid dry stone wall. The upstream slope is steep (1.67H to 1V) but apparently in stable condition. There were no indications of sloughs, cracks or other signs of distress. Only one location has riprap protection, however no signs of damage due to wave action was noted during the inspection. The nearly vertical (1H to 4V) downstream wall was in good condition. There were no signs of distortion or movement in the wall. On both sides of the conduit outlet are small bulges. These appear to be a part of the original construction. There were no signs of seepage through the wall with the reservoir at normal pool elevation.

2. Appurtenant Structures

The wetwell is constructed of loose stone walls and the only apparent concrete was for support of the stoplog slot. The well and the stoplogs appear to be in good condition. The upstream conduit is under water and was not inspected. The downstream conduit was in good condition.

The emergency spillway in the left abutment is in need of clearing and repair of the abutment walls. The walls are constructed of loose stone and are not in a condition to withstand a heavy discharge through the channel.

B. Design and Construction Data

Design and construction data for this dam does not exist, except one drawing (Appendix E, Plate V) indicating repairs to the upstream conduit and stoplog slot.

C. Operating Records

Formal operating records have not been maintained. The only reported flood elevation is for May 22, 1942, at which time the maximum flow was 5 feet over the stoplogs. The facilities were not in use from around 1890 to 1928. Considerable deterioration of the wall and embankment occurred during that time.

D. Post Construction Changes

Repairs to the wall and the embankment must have been made after 1928. The upstream conduit, formed by wooden supports and planking, was replaced in 1939 by a new concrete arch opening (Appendix E, Plate V). The entrance has a headwall and wingwalls.

E. Seismic Stability

This dam is located in Seismic Zone 1 and it is considered that the static stability is sufficient to withstand minor earthquake-induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection, the review of available data and operational history of White Oak Pond Dam indicate that the dam is in good condition.

In accordance with the guidelines of the Corps of Engineers, the hydrologic and hydraulic computations indicate that the facility has the capacity for passing the PMF without overtopping the dam. The combined spillway outlets are considered to be adequate, with the stop-logs placed to an elevation of 11.7 feet above the floor of the wetwell.

B. Adequacy of Information

The information available in the PennDER files and from the owner, together with the observed conditions at the site are considered sufficiently adequate for making a reasonable assessment of this facility.

C. Urgency

The recommendations presented as a result of this inspection should be implemented without delay.

D. Necessity for Additional Studies

Additional studies are not indicated at this time.

7.2 RECOMMENDATIONS

In order to assure the continued satisfactory operation of this dam, the following recommendations are presented for implementation by the owner:

1. That the emergency spillway in the left abutment be cleared of all brush and trees and that this maintenance be performed on a regular schedule.
2. That the slab and walls of the emergency spillway be restored to a structurally adequate condition.
3. That the upstream end of the outlet tunnel be inspected for possible obstruction.

4. That the downstream section of the outlet conduit be inspected on an annual basis for possible deterioration of concrete floor.
5. That a formal surveillance and downstream warning system be developed to be used during periods of heavy or prolonged precipitation.
6. That a program be developed for regular inspection and maintenance.

C

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APPENDIX A
CHECKLIST OF VISUAL INSPECTION REPORT

APPENDIX A

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 64-12

NDI NO. PA-00 147

NAME OF DAM White Oak Pond HAZARD CATEGORY High

TYPE OF DAM Earth embankment with d/s near vert. stone wall

LOCATION Clinton TOWNSHIP Wayne COUNTY, PENNSYLVANIA

INSPECTION DATE 10/24/79 WEATHER Cloudy, cool TEMPERATURE 40's

INSPECTORS: R. Houseal (Recorder) OWNER'S REPRESENTATIVE(s):

H. Jongsma

Jon Grindall

R. Shireman

Chuck Rupert

A. Bartlett

NORMAL POOL ELEVATION: 1366 AT TIME OF INSPECTION:

BREAST ELEVATION: 1380.4 POOL ELEVATION: 1366.5+

1373.5 Emergency Spillway

SPILLWAY ELEVATION: 1366 (top of stoplogs) TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: Unknown

GENERAL COMMENTS:

This reservoir is used for recreation (fishing) purposes.

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None observed.
B. UNUSUAL MOVEMENT BEYOND TOE	None observed - stone wall (nearly vertical) forms d/s side of embankment.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	None observed.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Horizontal slightly curved - okay. Vertical, See profile Plate A-II.
E. RIPRAP FAILURES	Riprap limited to small area adjacent to the intake structure. No failures observed.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Right side - embankment ties into natural ground. Stable condition. Left side - embankment abuts masonry stone spillway walls. Abutment appears sound.
G. SEEPAGE	None observed along downstream wall.
H. DRAINS	Outlet structure only.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Top - mowed grass. U/S slope - Mostly cut grass - some weeds and brush. D/S is masonry wall.

VISUAL INSPECTION
OUTLET WORKS

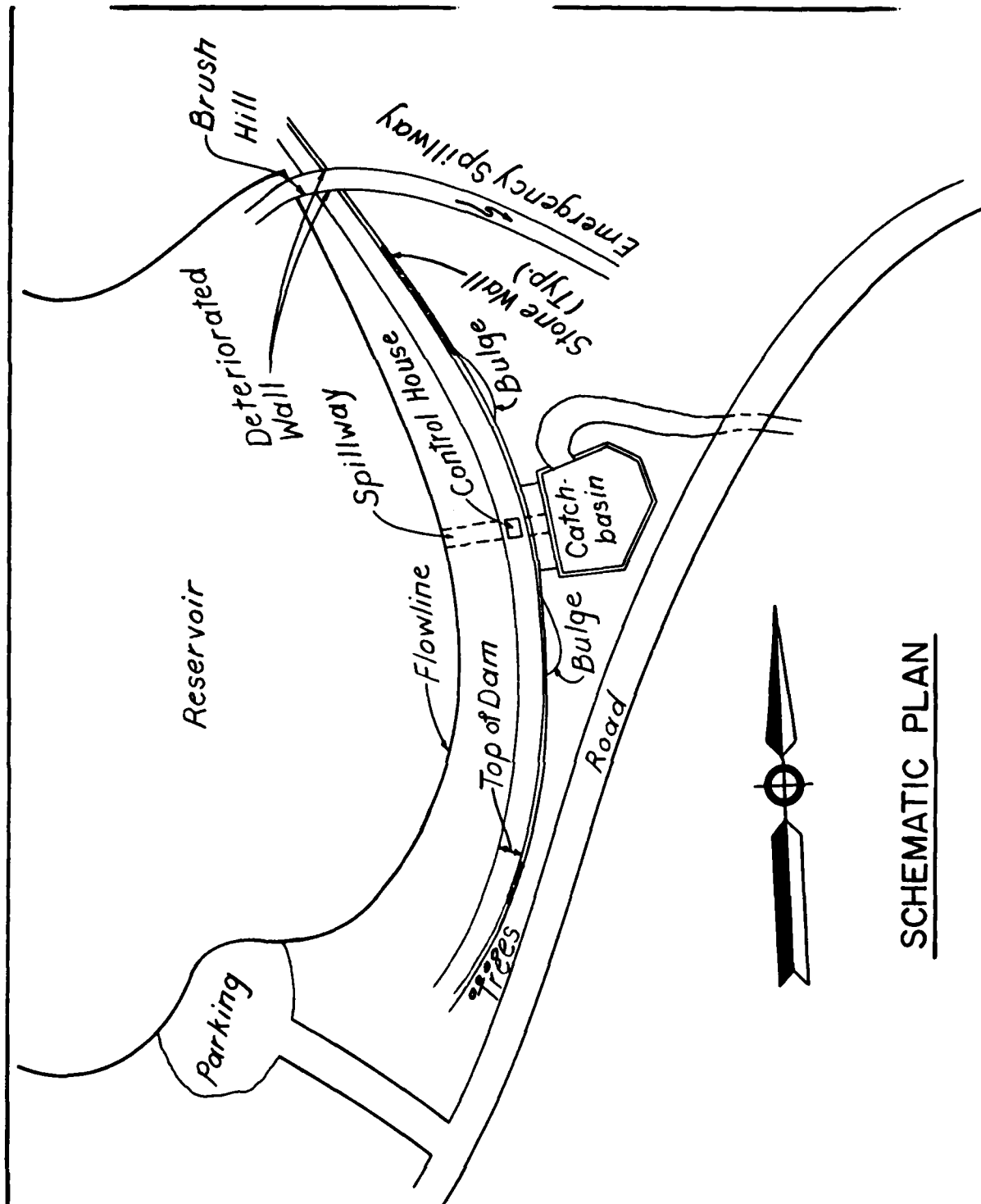
	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	Concrete headwall. Undefined obstruction - 5' below water surface.
B. OUTLET STRUCTURE	Through control house & wetwell with stoplogs for control.
C. OUTLET CHANNEL	Stone walls and bottom from control house.
D. GATES	Stoplogs.
E. EMERGENCY GATE	Stoplogs.
F. OPERATION & CONTROL	Stoplogs.
G. BRIDGE (ACCESS)	None - control house on breast of dam.

VISUAL INSPECTION
SPILLWAY
EMERGENCY SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Directly from reservoir - Normal Pool elevation is 7.5 feet below the spillway crest elevation. Spillway is seldom, if ever, used.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Broad crested weir of masonry stone. Stone walls are in poor condition and the area through the spillway is covered with weeds, brush and small trees. This area needs maintenance care in order to be made effective.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Discharge channel is in better condition than the spillway proper. The walls are low, (2' - 3') and are made of masonry stone. The channel curves to the right beyond the dam.
D. BRIDGE & PIERS	None.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	None.

VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
<u>INSTRUMENTATION</u>	
Monumentation	None
Observation Wells	None
Weirs	None
Piezometers	None
Staff Gauge	None
Other	None
<u>RESERVOIR</u>	
Slopes	Mostly woodlands - Stable 8° - 10°
Sedimentation	None reported
Watershed Description	Wooded and some agriculture
<u>DOWNSTREAM CHANNEL</u>	
Condition	Natural stream channel. Concrete holding basin d/s from the highway culvert.
Slopes	Stable, wooded and brush.
Approximate Population	Aldenville, about 4,000 feet downstream. Population 40.
No. Homes	10 houses in floodplain.



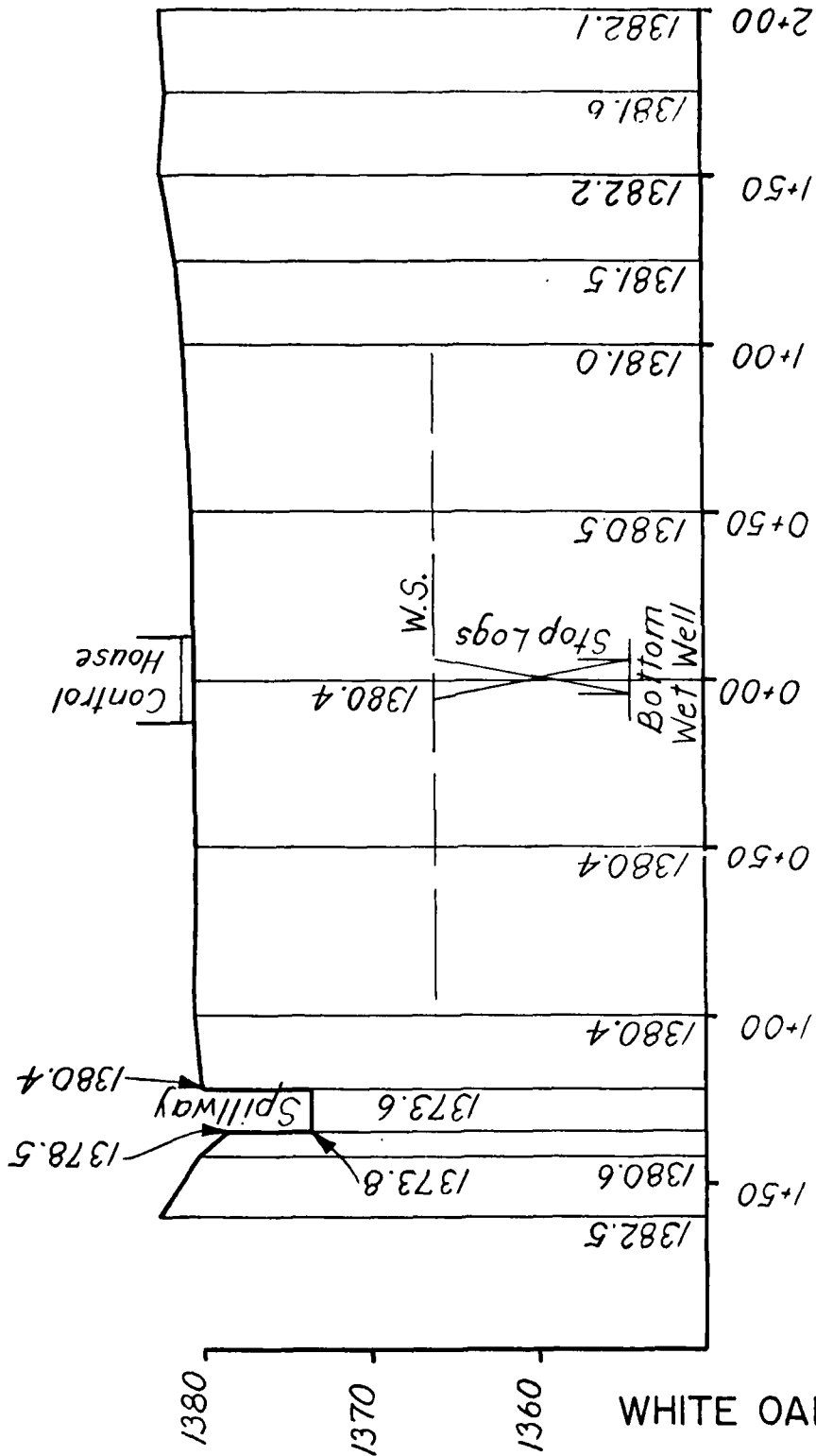
SCHEMATIC PLAN

Surveyed 10-24-79

WHITE OAK POND DAM
PA.-00147
INSPECTION SURVEY
PLATE A-I

Surveyed 10-24-79

EMBANKMENT PROFILE



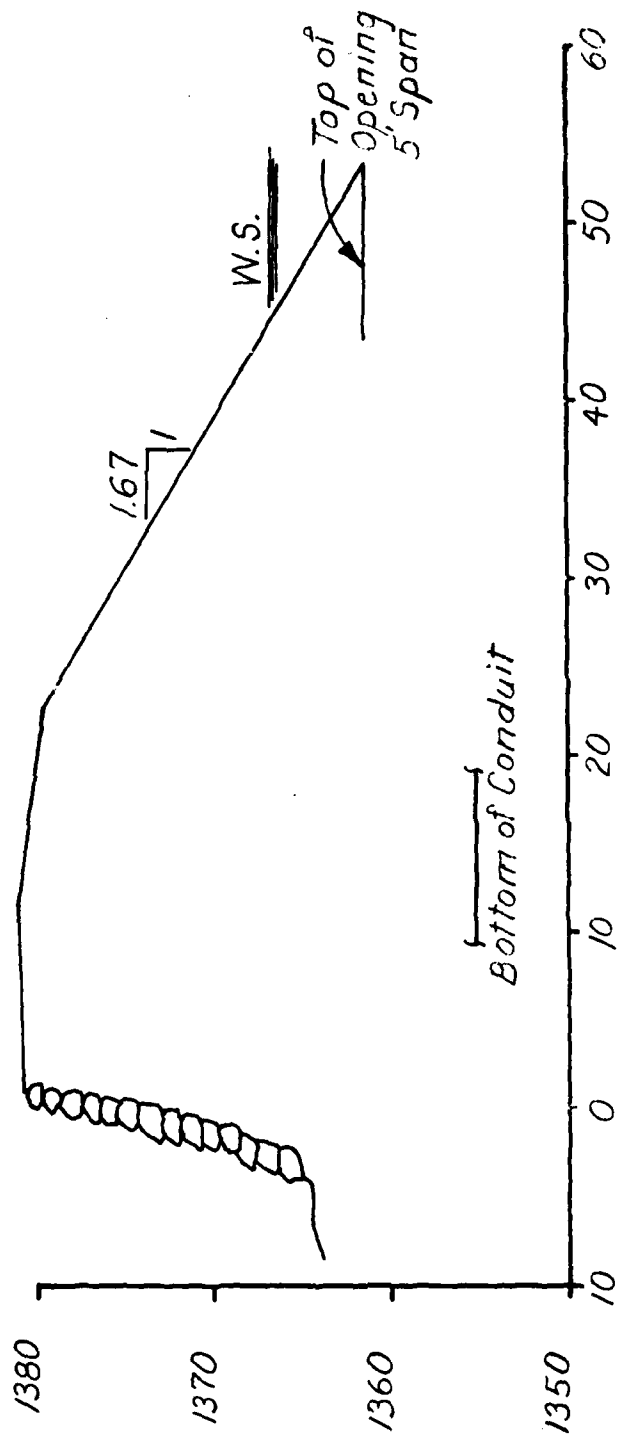
WHITE OAK POND DAM

PA.-00147

INSPECTION SURVEY

PLATE A-II

EMBANKMENT SECTION



Surveyed 10-24-79

WHITE OAK POND DAM

PA.-00147

INSPECTION SURVEY

PLATE A-III

APPENDIX B
CHECKLIST OF ENGINEERING DATA

APPENDIX B

CHECK LIST
ENGINEERING DATA

PA DER # 64-12

NDI NO. PA-00147

NAME OF DAM WHITE OAK POND

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle Forest City, Pa. See Plate II, Appendix E
CONSTRUCTION HISTORY	Built around 1830 by Delaware and Hudson Canal Co.. Abandoned around 1890. In 1928 the Pennsylvania Fish Commission restored the spillway, embankment and downstream masonry wall. Additional repairs in 1939.
GENERAL PLAN OF DAM	Schematic plan made by the Pennsylvania Fish Commission and partially retraced by Berger Assoc., Inc. (Appendix E, Plates III & IV).
TYPICAL SECTIONS OF DAM	Not available. See survey data Appendix A, Plate III.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Appendix E, Plates III through V. Not available.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	Not available.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	None.
POST CONSTRUCTION SURVEYS OF DAM	Schematic section and plan of dam.
BORROW SOURCES	Unknown.

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Changed wooden gate in sluiceway to stoplogs. New concrete entrance conduit (1939).
HIGH POOL RECORDS	May 22, 1942. Maximum recorded flow 5.0 feet above normal flow or 14 feet below crest of dam.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	Report by PennDER in 1928 indicating considerable rehabilitation required if Pennsylvania Fish Commission wants to reuse the reservoir which had been drained since 1890.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None reported.
MAINTENANCE & OPERATION RECORDS	No records except the 1928 report indicating that the downstream wall was in poor condition. Top of embankment uneven.
SPILLWAY PLAN, SECTIONS AND DETAILS	See Appendix E, Plates III through V.

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	Stoplogs only.
CONSTRUCTION RECORDS	None available.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	None.
MISCELLANEOUS	

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 50% wooded, 50% cultivated

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 1366 1694 Acre-Feet
5868
TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 1380.4 Acre-Feet
MAXIMUM DESIGN POOL: unknown Elev. 1366 (top of stoplogs)
TOP DAM: Elev. 1380.4 (low point)

SPILLWAY:

a. Elevation Top of stoplogs 1366, Emergency spillway 1373.6
b. Type stoplogs in wetwell and a broadcrested weir
c. Width 5'-0" 11'-0"
d. Length 6"
e. Location Spillover Center of dam Right abutment
f. Number and Type of Gates None None

OUTLET WORKS:

a. Type None
b. Location _____
c. Entrance inverts 1354.3±
d. Exit inverts 1354.3±
e. Emergency drawdown facilities Stoplogs

HYDROMETEOROLOGICAL GAGES:

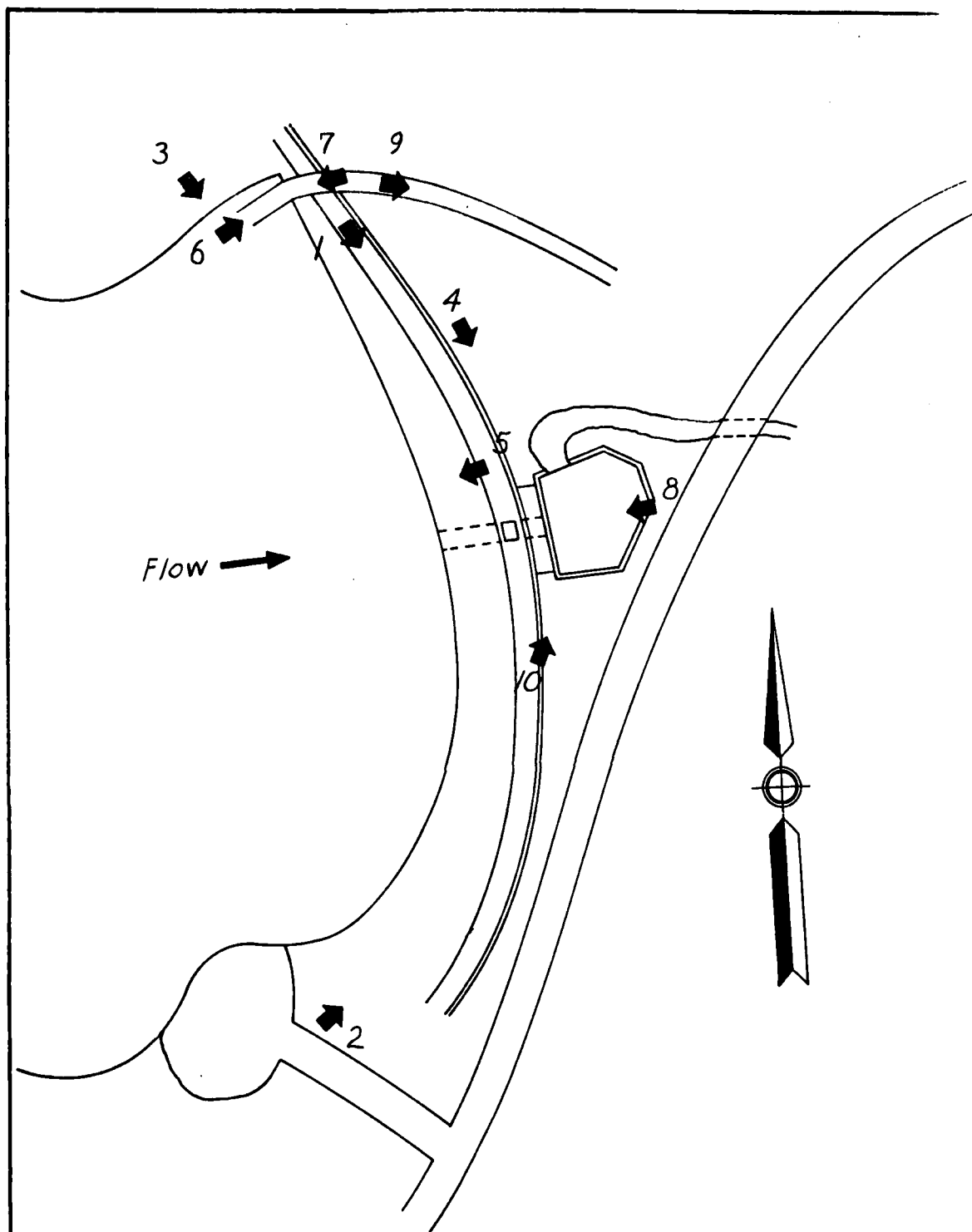
a. Type None
b. Location _____
c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE: 1132 cfs

APPENDIX C

PHOTOGRAPHS

APPENDIX C



WHITE OAK POND DAM
PA.-00147
KEY MAP OF PHOTOGRAPHS
PLATE C-I



RIGHT END OF EMBANKMENT - NO. 2

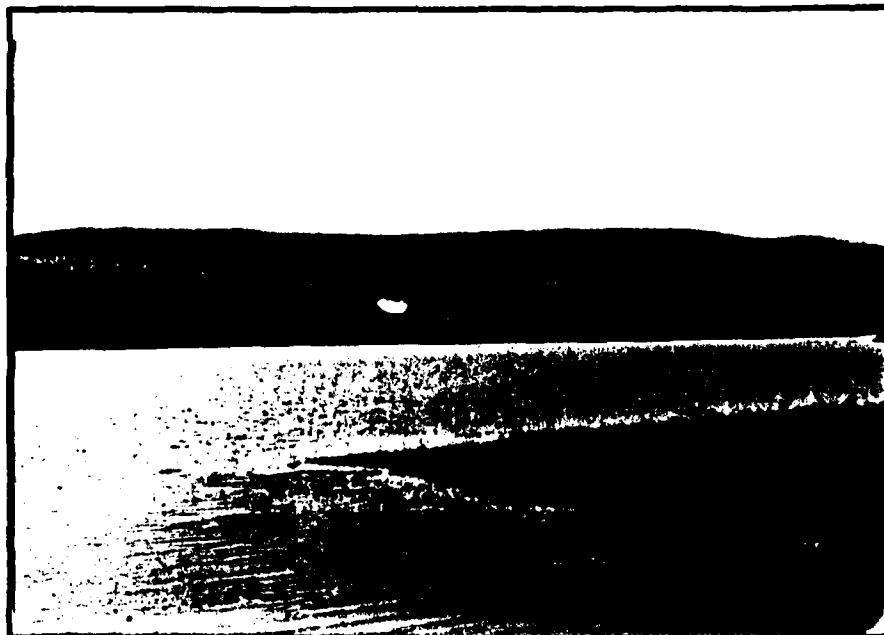


UPSTREAM SLOPE OF EMBANKMENT - NO. 3

PA-00147
Plate C-II



DOWNSTREAM WALL AND CONDUIT OUTLET - NO. 4



RESERVOIR AREA - NO. 5

PA-00147
Plate C-III

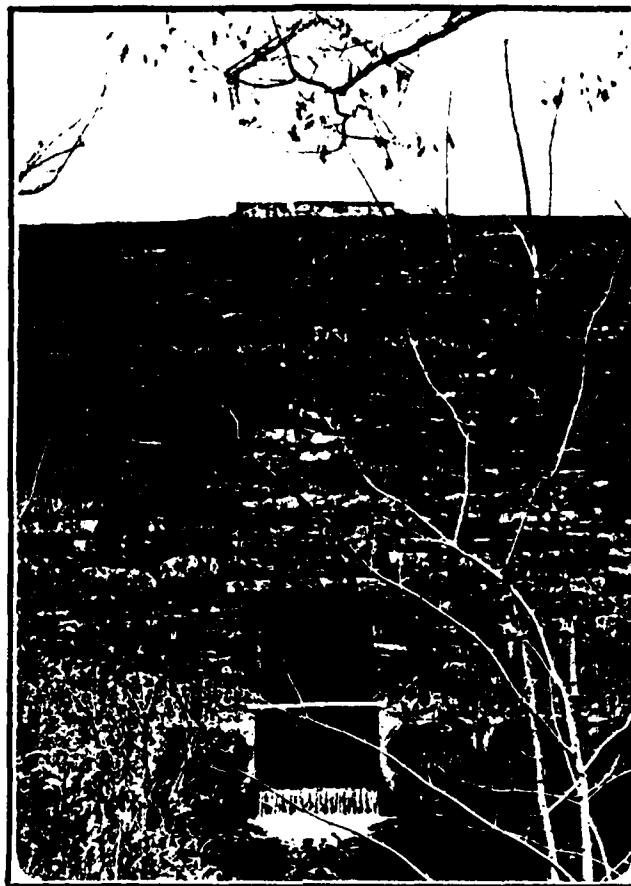


EMERGENCY SPILLWAY LOOKING DOWNSTREAM - NO. 6



EMERGENCY SPILLWAY LOOKING UPSTREAM - NO. 7

PA-00147
Plate C-IV



DOWNSTREAM CONDUIT OUTLET - NO. 8



DISCHARGE CHANNEL BELOW SPILLWAY WEIR - NO. 9

PA-00147
Plate C-V



DOWNSTREAM CHANNEL WITH CATCHBASIN - NO. 10

PA-00147
Plate C-VI

C

APPENDIX D
HYDROLOGY AND HYDRAULIC CALCULATIONS

APPENDIX D

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

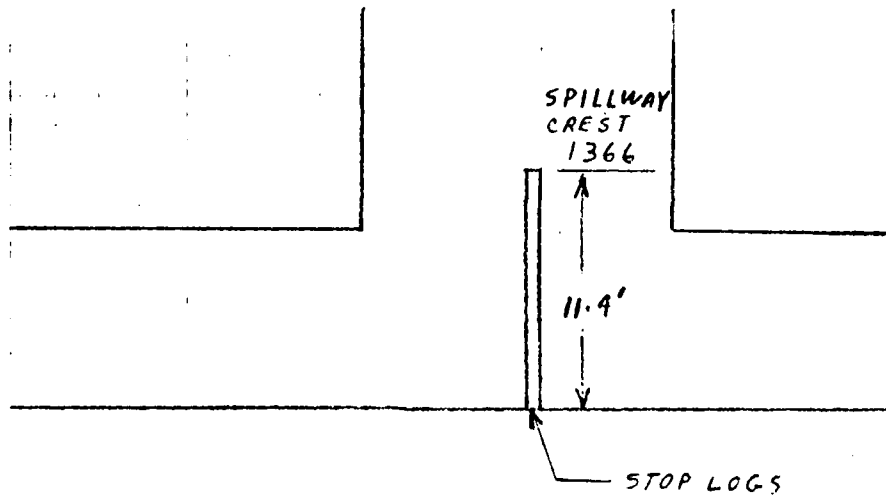
BY RLS DATE 12/5/79
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

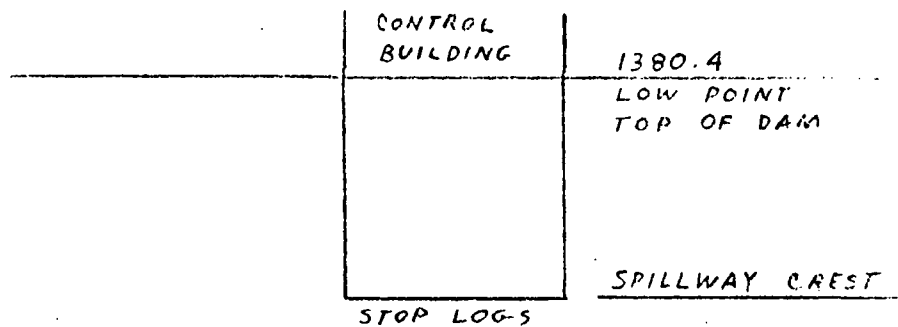
SHEET NO. _____
PROJECT 11

WHITE OAK FORD

SPILLWAY



$C = 3.32$ (KING'S HDBK.)



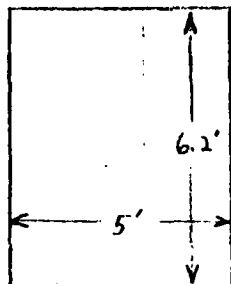
BY ALS DATE 12/5/79
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. _____
PROJECT 119650

WHITE OAK POND

SPILLWAY



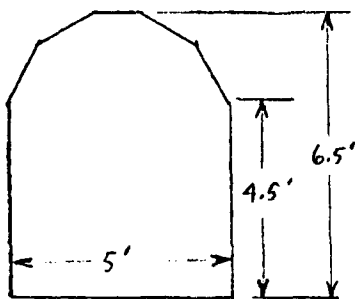
OUTLET TUNNEL DOWNSTREAM OF STOP LOGS

$$A = 6.2 \times 5 = 31 \text{ SQ. FT.}$$

$$\begin{aligned} \text{CENTROID} &= H/2 \\ &= 6.2/2 \\ &= 3.1 \text{ FT. ABOVE BOTTOM} \end{aligned}$$

MAXIMUM DISCHARGE WITHOUT SUBMERGED WEIR

$$\begin{aligned} Q &= C A \sqrt{2 g H} & C &= 0.6 \\ &= 0.6 \times 31 \times (2 \times 32.2 \times (11.4 - 3.1))^{.5} \\ &= 430 \text{ CFS} \end{aligned}$$



OUTLET TUNNEL UPSTREAM OF STOP LOGS

$$\text{AREA} = 29.4 \text{ S.F.}$$

$$\text{W.P.} = 20.76'$$

$$R = A/P = 1.416$$

$$R^{2/3} = 1.261$$

CONCRETE LINED

$N = .015$ (KING'S HDBK.)

LENGTH UPSTREAM = 24'

BY RLS DATE 12/5/29
 CHKD. BY _____ DATE _____
 SUBJECT _____

BERGER ASSOCIATES

SHEET NO. 3 OF 9
 PROJECT D9650

WHITE OAK POND

SPILLWAY RATING

H_w = HEAD ON WEIR (FT.)

Q = $CLH^{3/2}$ (ASSUMED FOR SUBMERGED CONDITION)

H_T = HEAD LOSS THROUGH TUNNEL* = $(Q \times N / (1.486 AR^{2/3}))^2 \times L$

H_o = HEAD LOSS THROUGH ORIFICE* = $(Q/CA)^2 / 2g$

H_D = HEAD ON WEIR, DOWNSTREAM SIDE = $H_o + 3.1 - 11.4$

H_{wa} = HEAD ON WEIR (ASSUMED FOR SUBMERGED CONDITION)

C' = DISCHARGE CORRECTION COEFFICIENT. FROM TABLE 13,
 WATER MEASUREMENT MANUAL, BUREAU OF RECLAMATION

Q_E = EQUIVALENT Q OVER WEIR = Q/C'

H_w = COMPUTED HEAD ON WEIR = $(Q/CL)^{2/3}$

POOL ELEV. = $1366 + H_w + H_T$

H_w	Q CFS	H_T	H_o	H_D	H_{wa}	H_D/H_{wa}	C'	Q_E	H_w	POOL ELEV.
.5	6	0								1366.5
1	17	0								1367
2	47	0								1368
3	86	0								1369
4.5	158	0								1370.5
6	244	.1								1372.1
7.5	341	.2								1373.7
8.7	426	.3								1375
	475	.4	10.1	1.8	4.4	.19	.981	484	7.5	1375.9
	500	.4	11.2	2.9	10	.29	.942	531	10.1	1376.5
	525	.5	12.4	4.1	10.8	.38	.903	581	10.7	1377.2
	575	.6	14.8	6.5	12	.54	.819	702	12.1	1378.7
	625	.7	17.5	9.2	13.9	.66	.733	853	13.8	1380.5
	650	.8	19	10.7	14.9	.72	.68	956	14.9	1381.7

*Tunnel is upstream of weir

*Orifice is downstream of weir

BY: RLS DATE 12/6/79

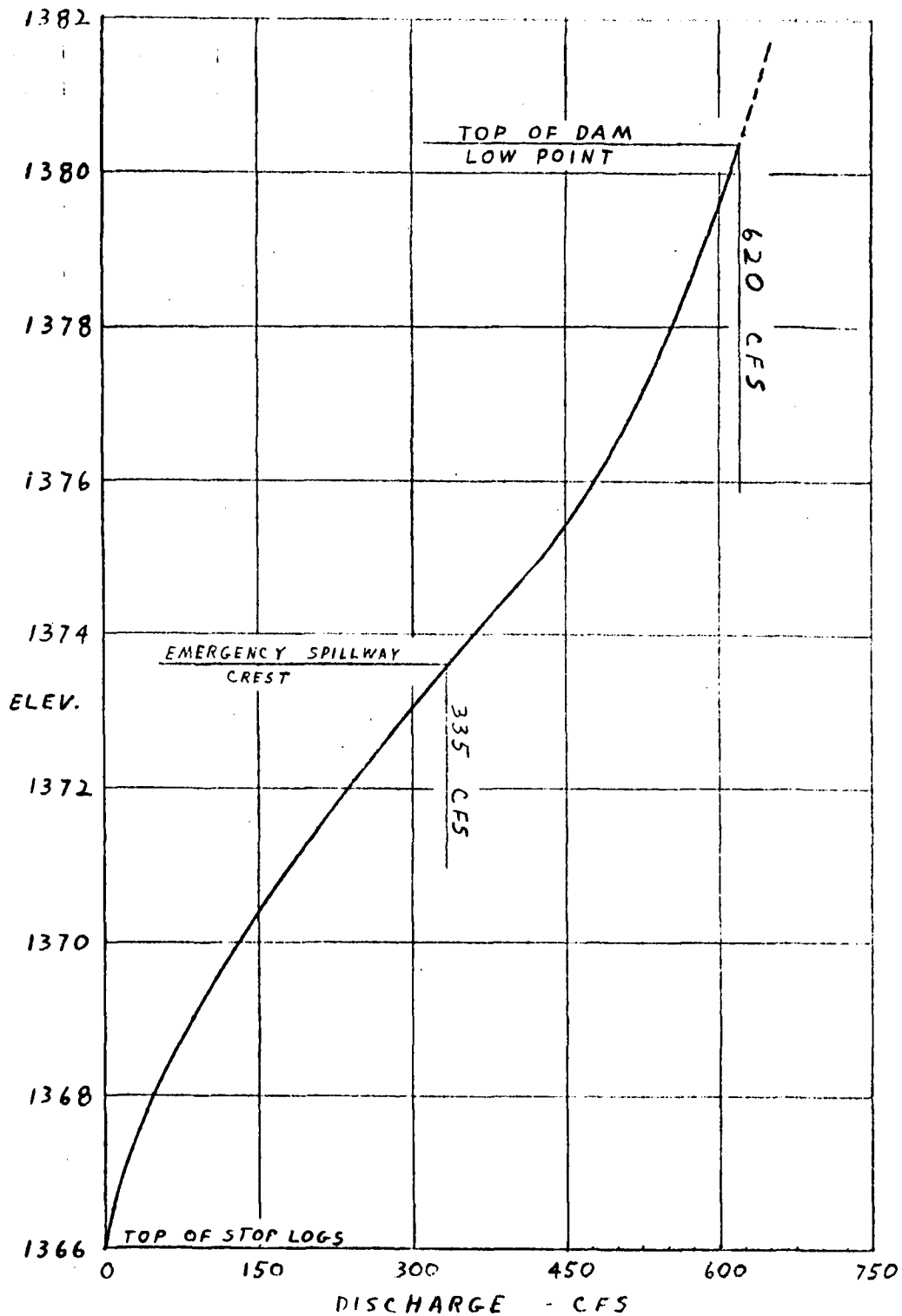
BERGER ASSOCIATES

SHEET NO. 1 OF
PROJECT D7650

CHKD. BY DATE

SUBJECT WHITE OAK POND

SPILLWAY RATING CURVE



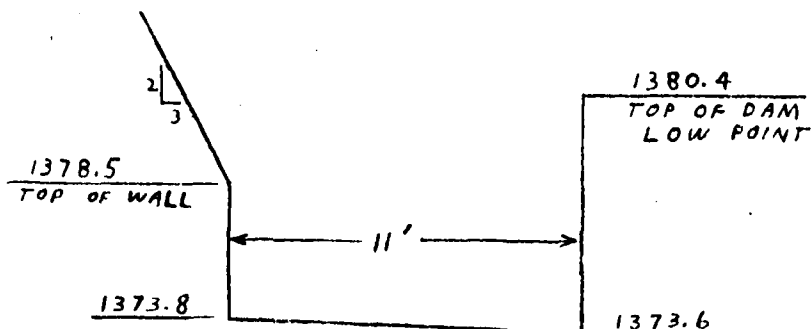
BY RLS DATE 12/6/79
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. _____ OF _____
PROJECT 9650

WHITE OAK POND

EMERGENCY SPILLWAY RATING



BROAD CRESTED WEIR

$C = 2.63$ (KING'S HDBK.)

$$\begin{aligned}\text{MEAN BOTTOM ELEV.} &= (1373.8 + 1373.6) / 2 \\ &= 1373.7\end{aligned}$$

$$Q = CLH^{3/2}$$

$$C = 2.63$$

$$L = 11'$$

$$H = (1378.5 - 1373.7) = 4.8'$$

$$Q = 2.63 \times 11 \times (4.8)^{1.5} = 304 \text{ CFS}$$

MAXIMUM KNOWN FLOOD AT DAM SITE

THE MAXIMUM KNOWN FLOOD AT WHITE OAK POND OCCURRED IN MAY 1942, WHEN THE WATER LEVEL ROSE TO 5 FEET ABOVE NORMAL POOL LEVEL.

$$C = 3.32$$

$$L = 5'$$

$$H = 5'$$

$$\begin{aligned}Q &= CLH^{3/2} \\ &= 3.32 \times 5 \times (5)^{1.5} = 186 \text{ CFS}\end{aligned}$$

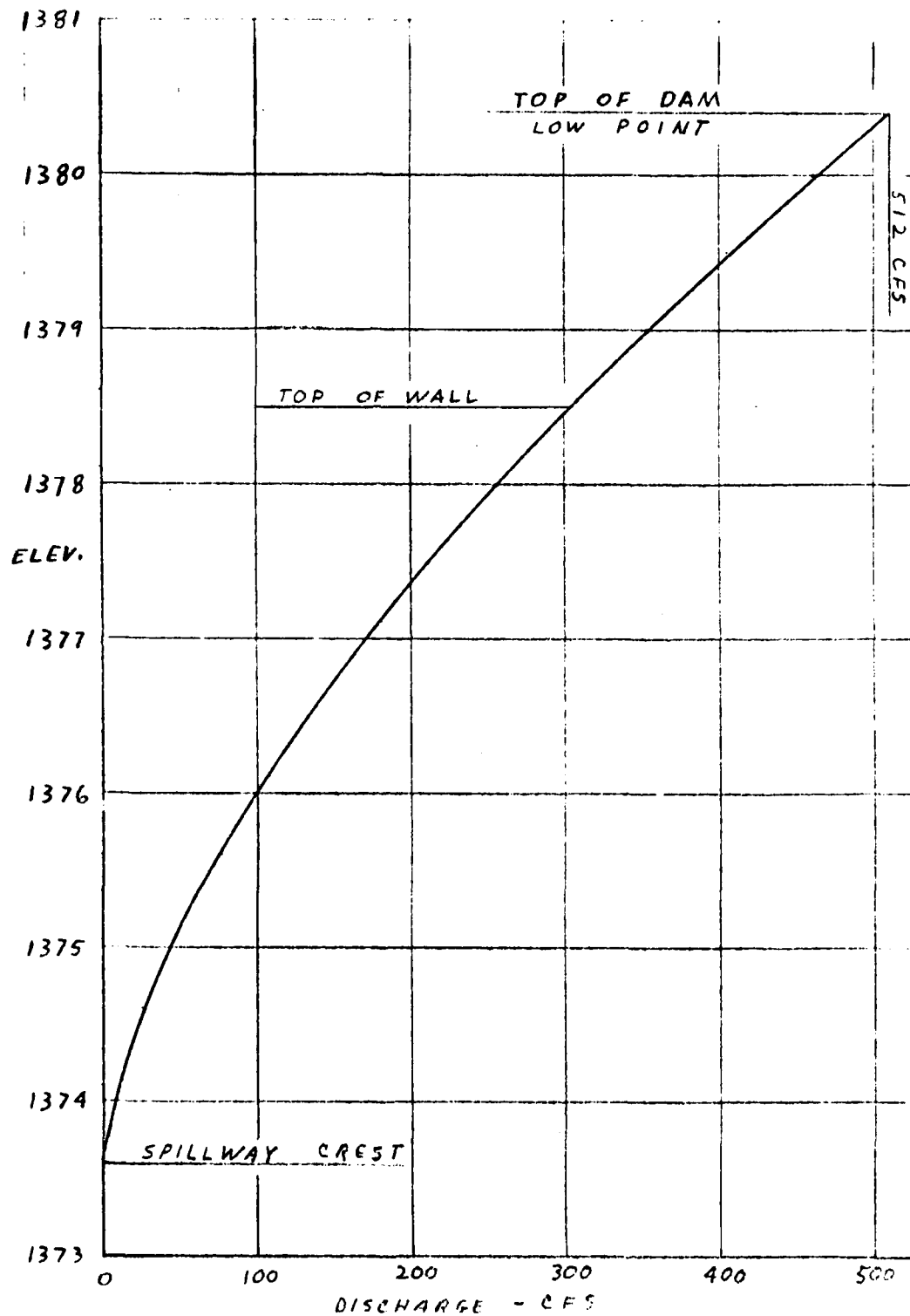
BY RLS DATE 12/6/79
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. _____ OF _____
PROJECT 19000

WHITE OAK POND

EMERGENCY SPILLWAY RATING CURVE

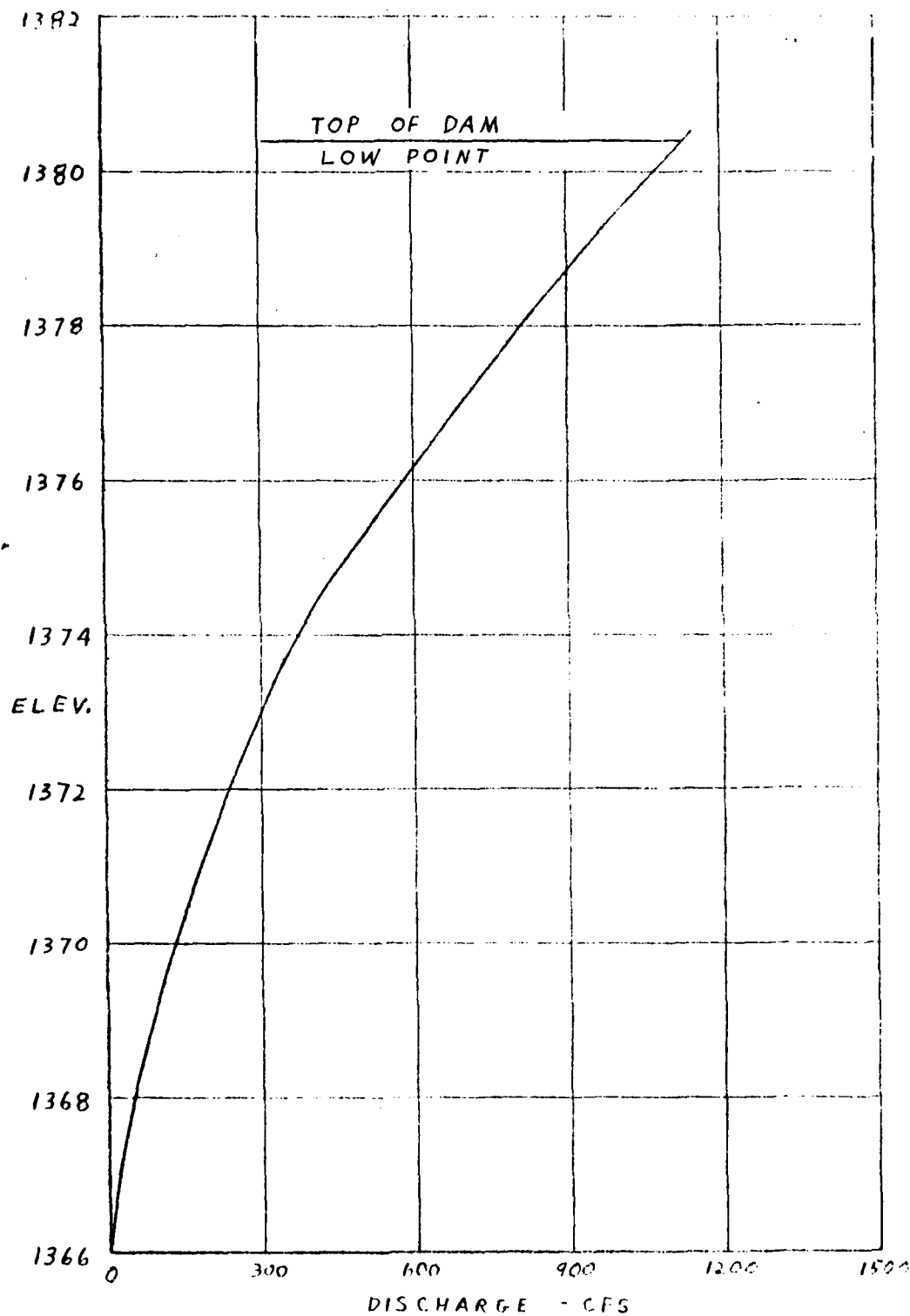


BY RLS DATE 12/6/79
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. _____
PROJECT 1115

TOTAL DISCHARGE CURVE



BY RLS DATE 12/6/79
CHKD. BY DATE
SUBJECT

BERGER ASSOCIATES

SHEET NO. OF
PROJECT 1403

WHITE OAK POND

SIZE CLASSIFICATION

MAXIMUM STORAGE = 4768 ACRES-FT

MAXIMUM HEIGHT = 26 FEET

SIZE CLASSIFICATION IS "INTERMEDIATE"

HAZARD CLASSIFICATION

VILLAGE OF ALDENVILLE LIES ALONG THE
DOWNSTREAM CHANNEL.

USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOD

THE ABOVE CLASSIFICATIONS INDICATE
USE OF AN SDF EQUAL TO THE
PROBABLE MAXIMUM FLOOD.

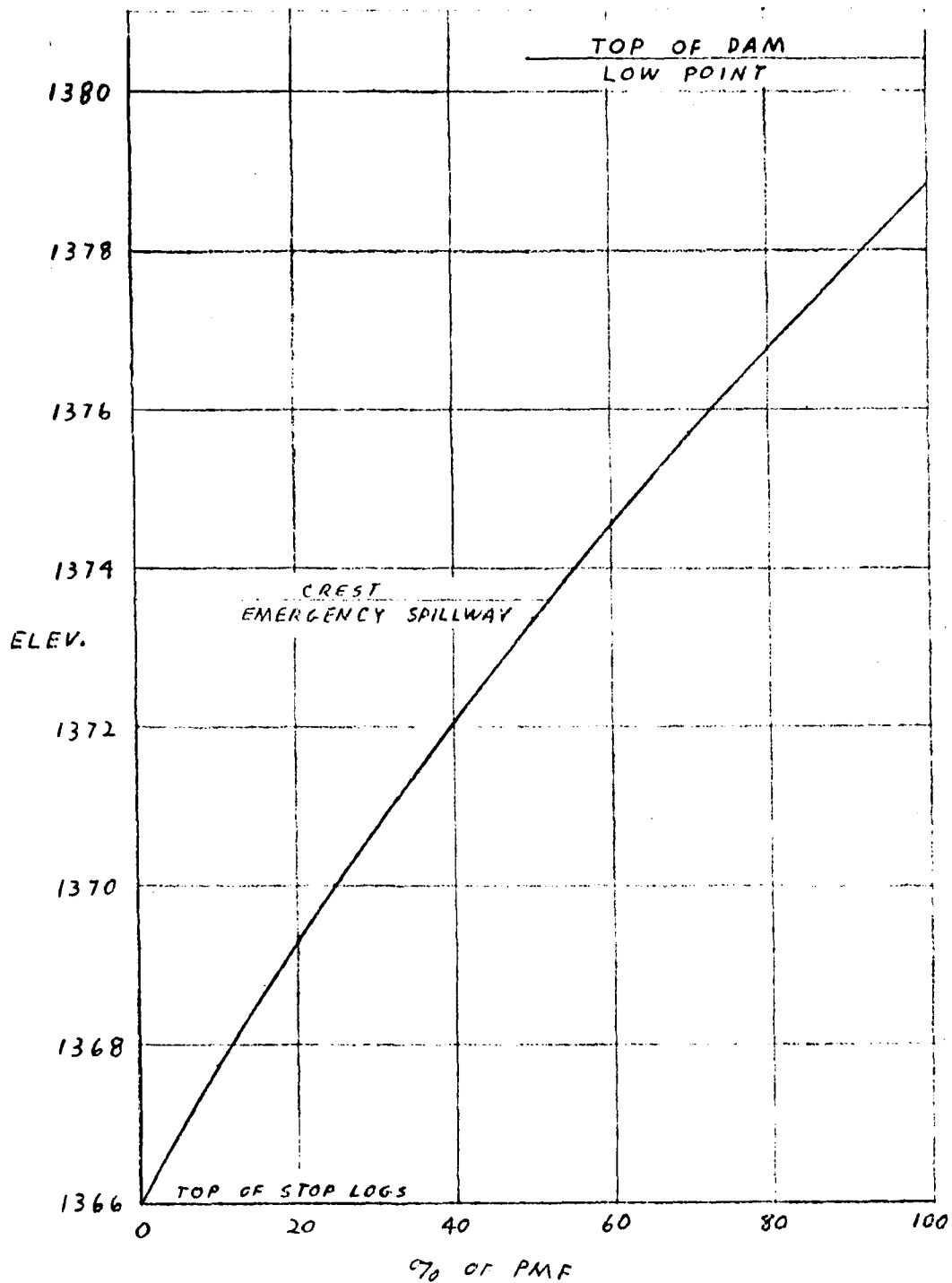
BY RLS DATE 12/10/79
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. _____
PROJECT _____

OF _____

SPILLWAY CAPACITY CURVE



HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: WHITE OAK POND RIVER BASIN: DELAWARE
PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.2 INCHES/24 HOURS⁽¹⁾

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		White Oak Pond	White Oak Pond Dam		
DRAINAGE AREA (SQUARE MILES)		3.8	-		
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		3.8	3.8		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%) ⁽²⁾	6 HOURS	111	-		
	12 HOURS	123	-		
	24 HOURS	133	-		
	48 HOURS	142	-		
	72 HOURS	-	-		
SNYDER HYDROGRAPH PARAMETERS	ZONE ⁽³⁾	1	-		
	C_p / C_t ⁽⁴⁾	0.45/1.23	-		
	L (MILES) ⁽⁵⁾	3.06	-		
	L_{co} (MILES) ⁽⁵⁾	1.50	-		
	$T_p = C_t (L \cdot L_{co})^{0.3}$ (hours)	1.94	-		
SPILLWAY DATA	CREST LENGTH (FT.)	-	(STOPLOGS) 5	(EMERGENCY) 11	
	FREEBOARD (FT.)	-	14.4	6.8	
	DISCHARGE COEFFICIENT	-	3.32	2.63	
	EXPONENT	-	1.5	1.5	
	ELEVATION	-	1366	1373.6	
AREA ⁽⁶⁾ (ACRES)	NORMAL POOL	-	223		
	ELEV. <u>1380</u>	-	358		
	ELEV. <u>1400</u>	-	485		
STORAGE (ACRE-Feet)	NORMAL POOL ⁽⁷⁾	-	1694		
	ELEV. <u>1343.2</u> ⁽⁸⁾	-	0		
	ELEV. _____ ⁽⁸⁾				
	ELEV. _____ ⁽⁸⁾				

- (1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.
- (2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.
- (3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).
- (4) Snyder's Coefficients.
- (5) L = Length of longest water course from outlet to basin divide.
 L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.
- (6) Planimetered area encompassed by contour upstream of dam.
- (7) PennDER files.
- (8) Computed by conic method.

1	A1	WHITE OAK POND DAM	***	TRIBUTARY TO WEST BRANCH LACKAWAXEN RIVER						
2	A2	CLINTON TWP., WAYNE COUNTY, PA.								
3	A3	NDI # PA-00147		PA DER # 64-12						
4	D	300	0	15	0	0	0	0	0	0
5	B1	5								
6	J	1	9	1						
7	J1	1	.7	.8	.7	.6	.5	.4	.35	.1
8			1					1		
9	K1		INFLOW HYDROGRAPH							
10	H	1	1	3.8						
11	P		21.2	111	123	133	142			
12	T							1	.05	
13	W	1.94	.45							
14	X	-1.5	.05	2						
15	K	1	2					1		
16	K1		RESERVOIR ROUTING							
17	Y									
18	Y1	1						1694	-1	
19	Y4	1366	1366.5	1367	1368	1369	1370.5	1372.1	1373.7	1375 1375.9
20	Y41376.5		1377.2	1378.7	1380.5					
21	Y5	0	6	17	47	86	158	244	341	469 569
22	Y5	636	714	898	1146					
23	SA	0	223	359	485					
24	SE1343.2		1366	1380	1400					
25	SE	1366								
26	SE1380.4									
27	K	99								

1

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
END OF NETWORK	

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

RUN DATE* 79/12/10.
 TIME* 05.33.54.

WHITE OAK POND DAM *** TRIBUTARY TO WEST BRANCH LACKAWAXEN RIVER
 CLINTON TWP., WAYNE COUNTY, PA.
 NDI # PA-00147 PA DER # 64-12

JOB SPECIFICATION									
NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IFLT	IFRT	NSTAN
300	0	15	0	0	0	0	0	-4	0
				JOPER	NWT	LROPT	TRACE		
				5	0	0	0		

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRTIO= 9 LRTIO= 1
 RTIOS= 1.00 .90 .80 .70 .60 .50 .40 .25 .10

CLINTON TWP., OHIO
PDI # FA-00147

NO	HR	RAIN	LOSS	EXCS	COMP	PERIOD	RAIN	EXCS	LOSS	COMP
300	0	15	0	0	0	0	0	0	0	0
			5	0	0	0				

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= 1.00 .90 .80 .70 .60 .50 .40 .25 .10

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JFRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	3.80	0.00	3.80	0.00	0.000	0	0	0

PRECIP DATA

SFFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.20	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRAR	DLTKR	RTIOL	ERAIN	STRKS	RTICK	STRTL	CNSTL	ALSHX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.94 CP= .45 NTA= 0

RECESSION DATA

STRTO= -1.50 GRCSN= .05 RTICK= 2.00

UNIT HYDROGRAPH 71 END-OF-PERIOD ORDINATES, LAG= 1.94 HOURS, CP= .45 VOL= 1.00

23.	87.	178.	284.	393.	485.	547.	574.	556.	514.
475.	438.	404.	373.	344.	318.	293.	271.	250.	231.
213.	196.	181.	167.	154.	143.	132.	121.	112.	103.
96.	89.	81.	75.	69.	64.	59.	54.	50.	46.
43.	40.	37.	34.	31.	29.	26.	24.	23.	21.
19.	18.	16.	15.	14.	13.	12.	11.	10.	9.
9.	8.	7.	7.	6.	6.	5.	5.	5.	4.
4.									

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP
-------	-------	--------	------	------	------	------	-------	-------	--------	------	------	------	------

SUM 24.08 21.70 2.33 211806.
(612.)(551.)(81.)(7997.60)

RESERVOIR ROUTING

ISTAG	ICONE	IECON	ITIME	ITEL	ITRT	ITRA	ITAGE	ITDIO
2	1	0	0	0	0	1	0	0

ROUTINE DATA

DIOS	DIOS	AVG	IPES	ISAME	ITEL	ITRT	ITRA
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTD	LAG	AMSK	X	TSK	STGR	ISPRAT
1	0	0	0.000	0.000	0.000	1694.	-1

STAGE	1366.00	1366.50	1367.00	1368.00	1369.00	1370.50	1372.10	1373.70	1375.00	1375.90
	1376.50	1377.20	1378.70	1380.50						

FLOW	0.00	6.00	17.00	47.00	86.00	158.00	244.00	341.00	469.00	569.00
	636.00	714.00	898.00	1146.00						

SURFACE AREA= 0. 223. 358. 485.

CAPACITY= 0. 1695. 5725. 14123.

ELEVATION= 1343. 1366. 1380. 1400.

CREL	SPWID	COBW	EXPW	ELEV	COBL	CAREA	EXPL
1366.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	CORD	EXPD	DAMWID
1380.4	0.0	0.0	0.

PEAK OUTFLOW IS 911. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 788. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 666. AT TIME 50.25 HOURS

PEAK OUTFLOW IS 547. AT TIME 50.50 HOURS

PEAK OUTFLOW IS 427. AT TIME 50.75 HOURS

PEAK OUTFLOW IS 321. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 243. AT TIME 51.25 HOURS

PEAK OUTFLOW IS 134. AT TIME 51.50 HOURS

PEAK OUTFLOW IS 39. AT TIME 52.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PEAK-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CFS) METERS PER SECOND
 AREA IN SQUARE METERS (CFS PER METERS PER SECOND)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				1.00	.90	.80	.70	.60	.50	.40	.25	.10
HYDROGRAPH AT	1	3.80	1	7326.	6593.	5860.	5128.	4395.	3663.	2930.	1831.	733.
	(	9.84)	(	207.44)	(186.69)	(165.95)	(145.20)	(124.46)	(103.72)	(82.97)	(51.86)	(20.74)
ROUTED TO	2	3.80	1	911.	788.	666.	547.	427.	321.	243.	134.	39.
	(	9.84)	(	25.81)	(22.31)	(18.87)	(15.49)	(12.10)	(9.10)	(6.83)	(3.81)	(1.09)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1365.99	1366.00	1380.40
STORAGE	1692.	1695.	5868.
OUTFLOW	0.	0.	1132.

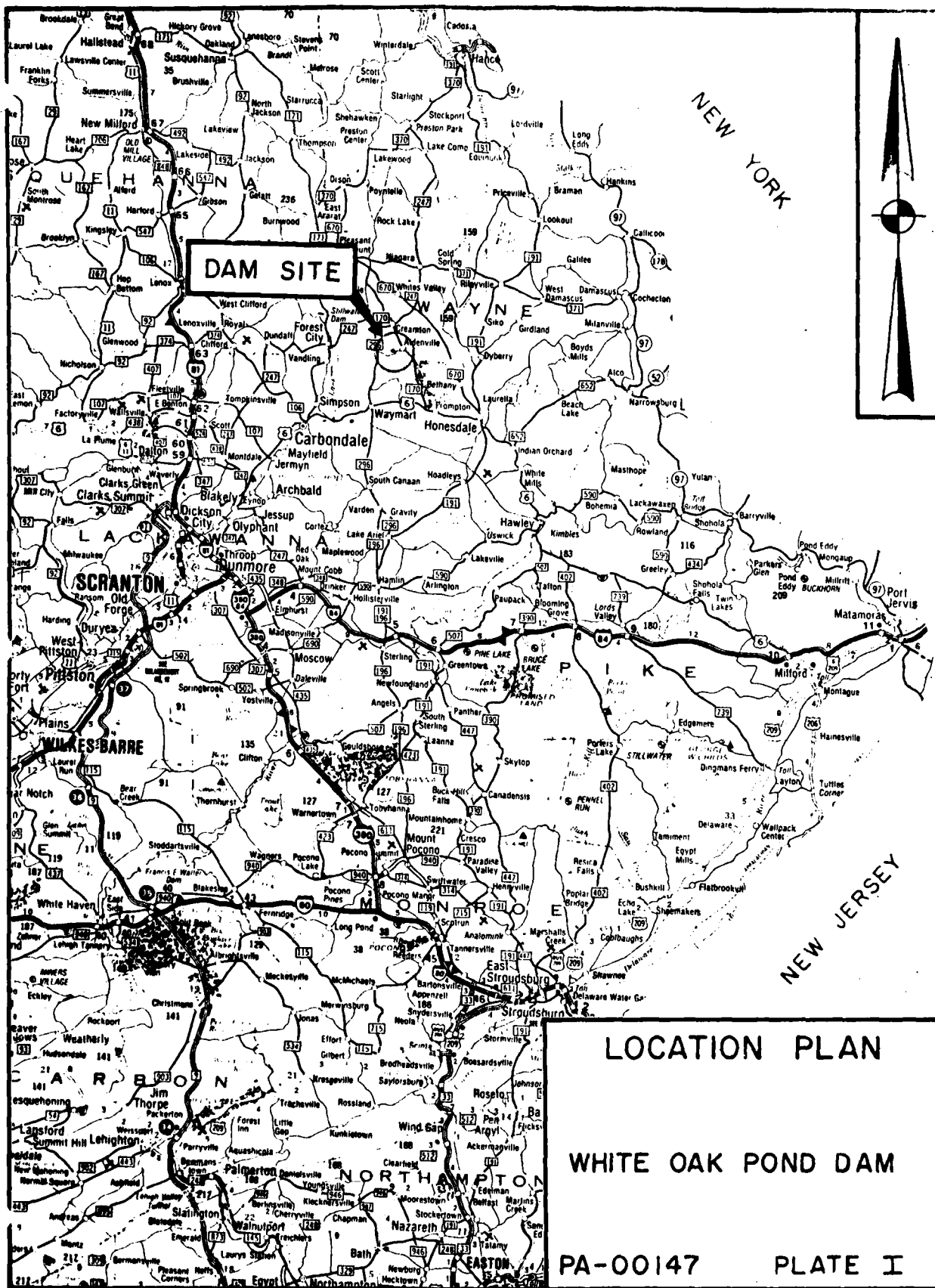
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1378.80	0.00	5302.	911.	0.00	50.00	0.00
.90	1377.80	0.00	4964.	788.	0.00	50.00	0.00
.80	1376.77	0.00	4624.	666.	0.00	50.25	0.00
.70	1375.70	0.00	4283.	547.	0.00	50.50	0.00
.60	1374.58	0.00	3938.	427.	0.00	50.75	0.00
.50	1373.37	0.00	3581.	321.	0.00	51.00	0.00
.40	1372.08	0.00	3214.	243.	0.00	51.25	0.00
.25	1370.01	0.00	2659.	134.	0.00	51.50	0.00
.10	1367.72	0.00	2091.	39.	0.00	52.50	0.00

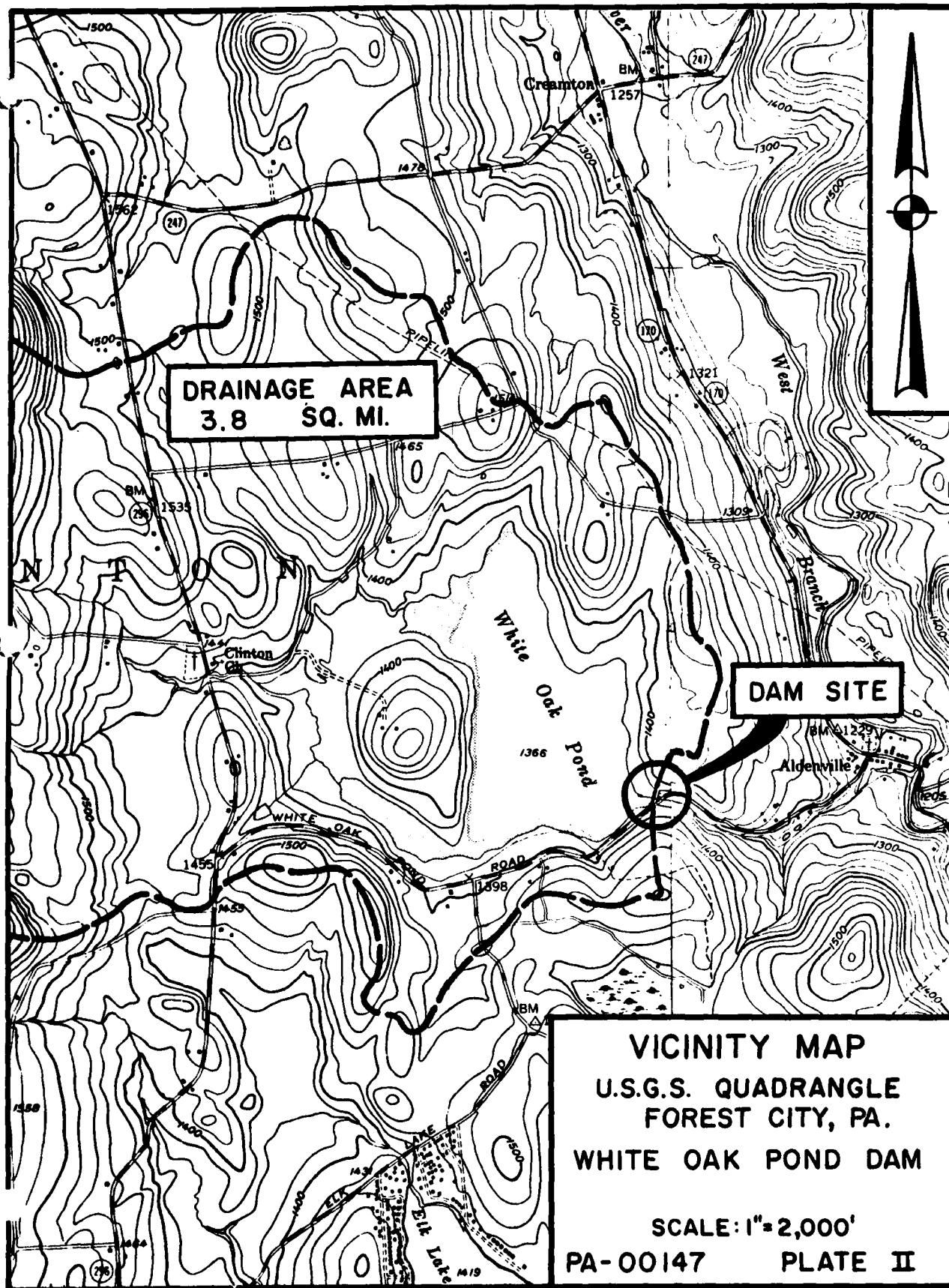
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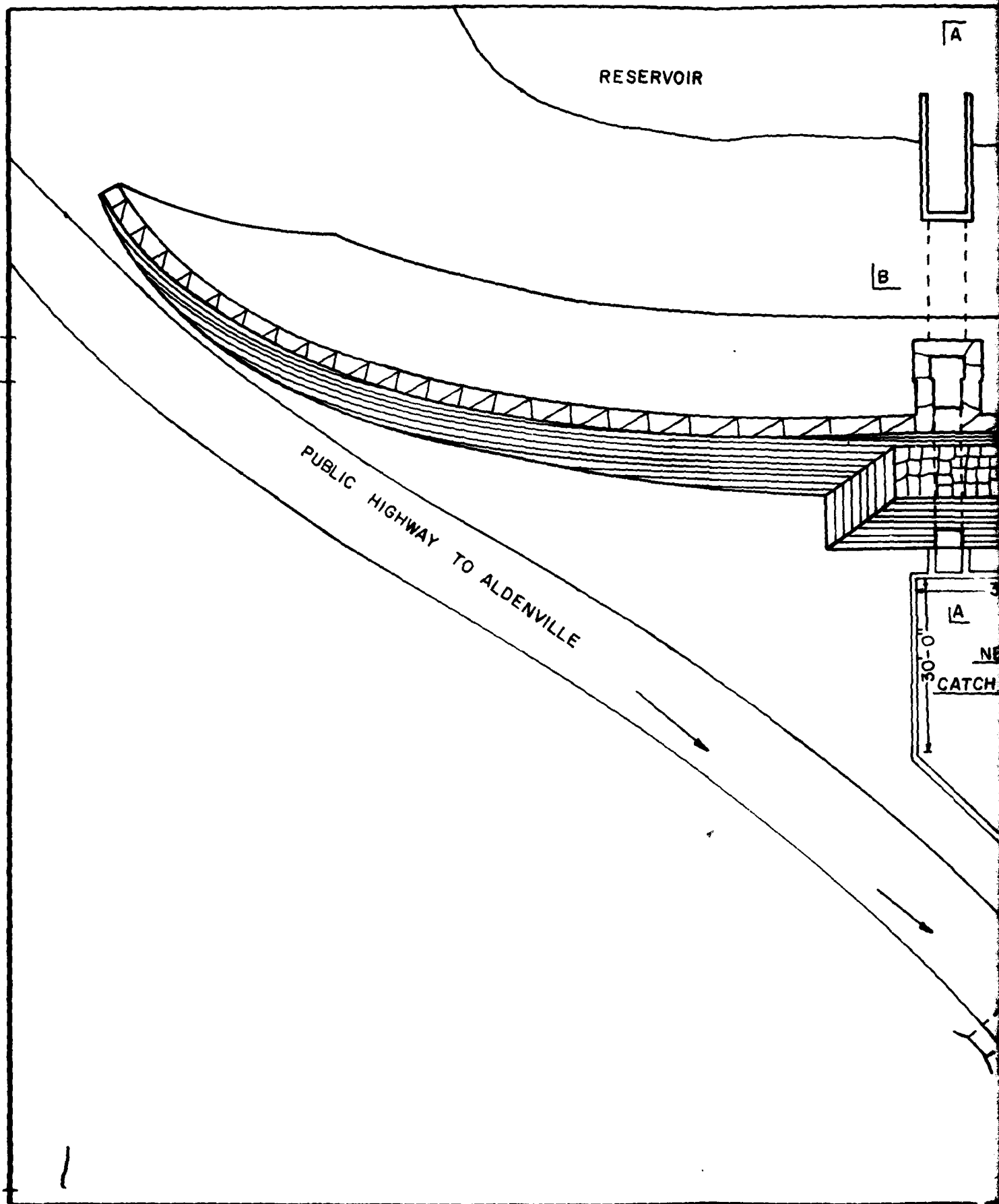
APPENDIX E

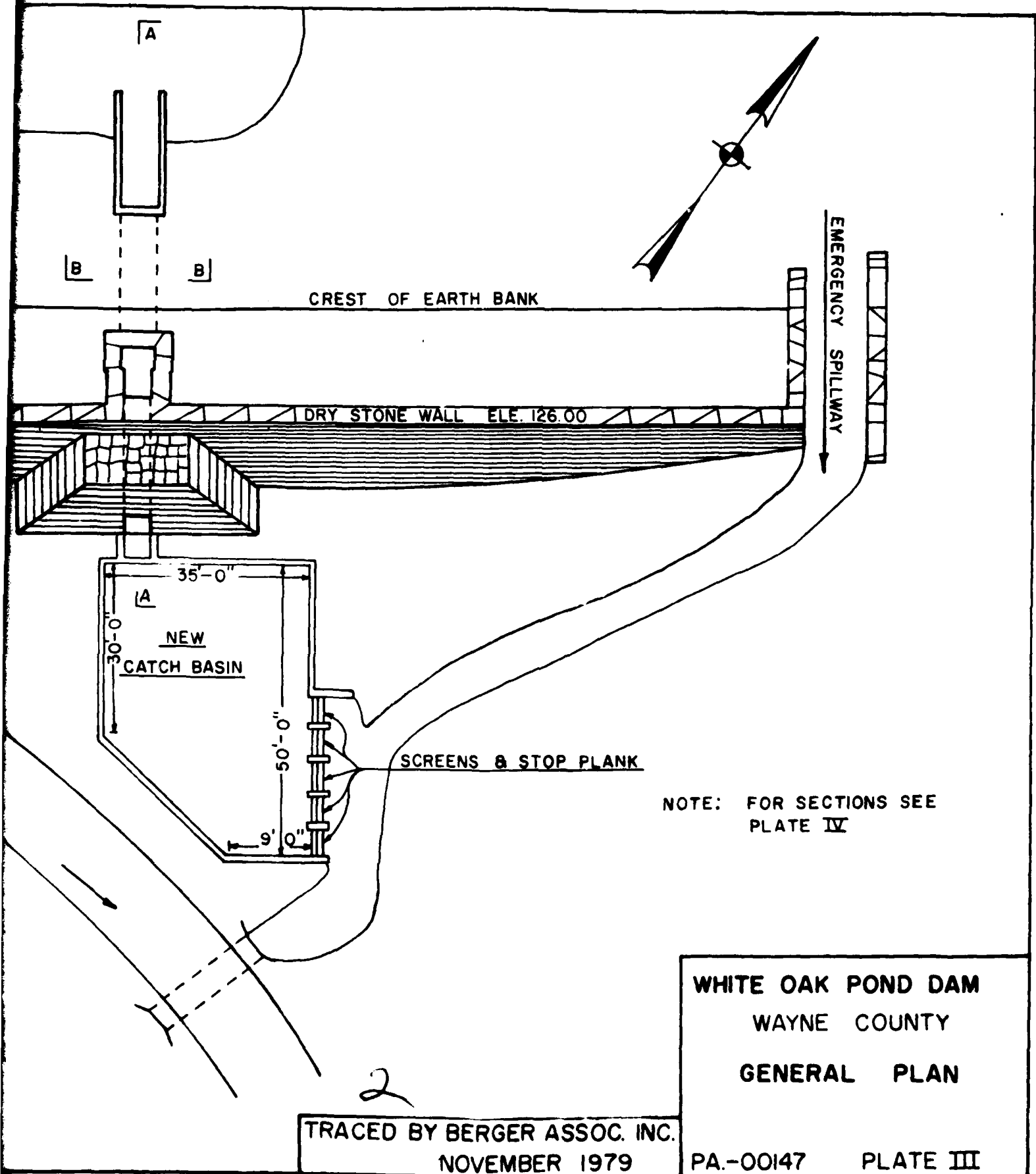
PLATES

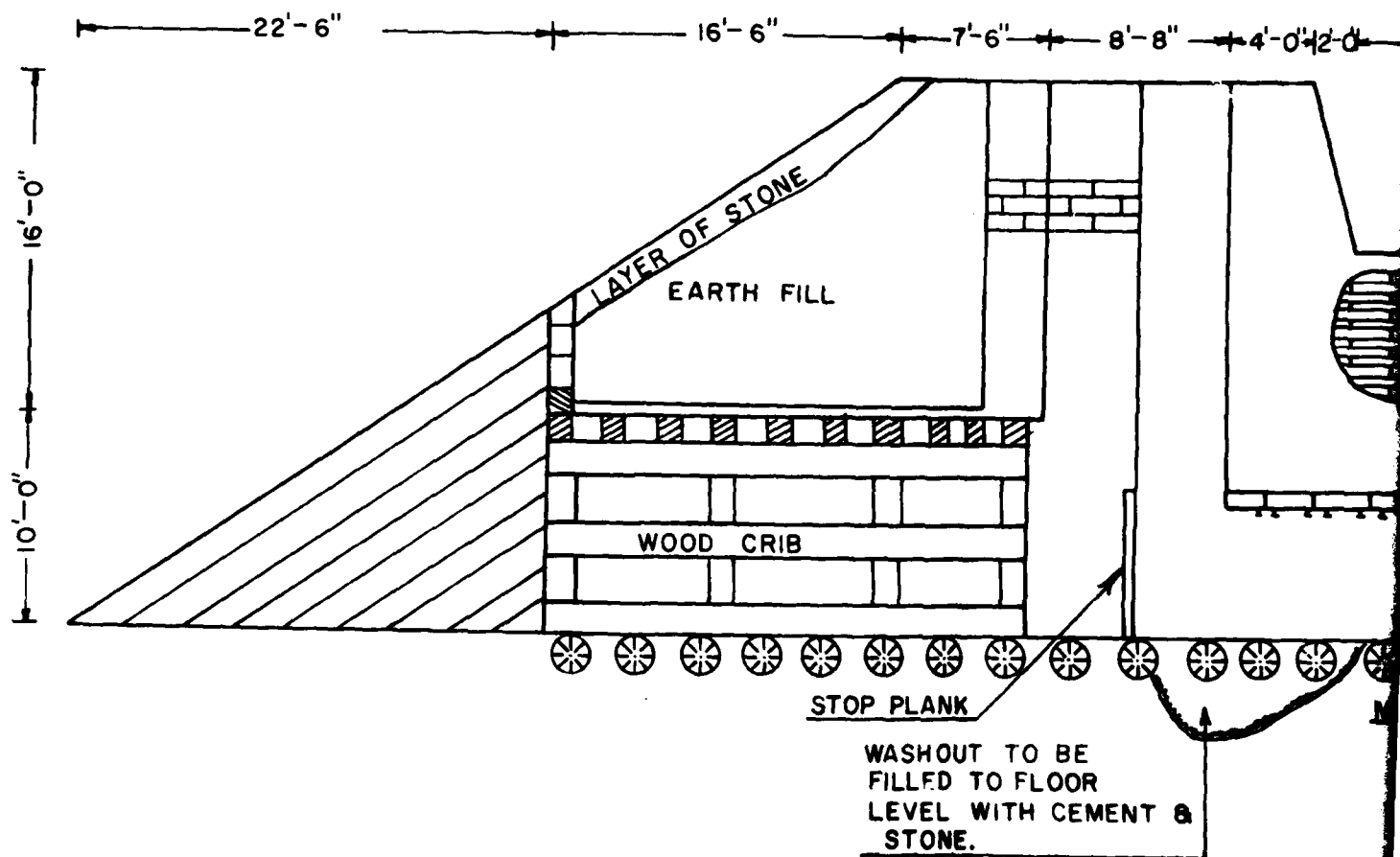
APPENDIX E



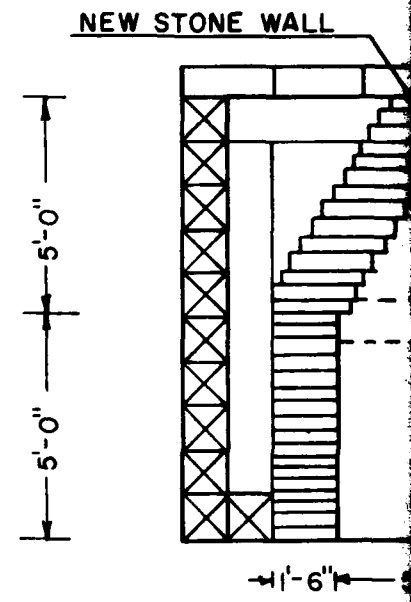
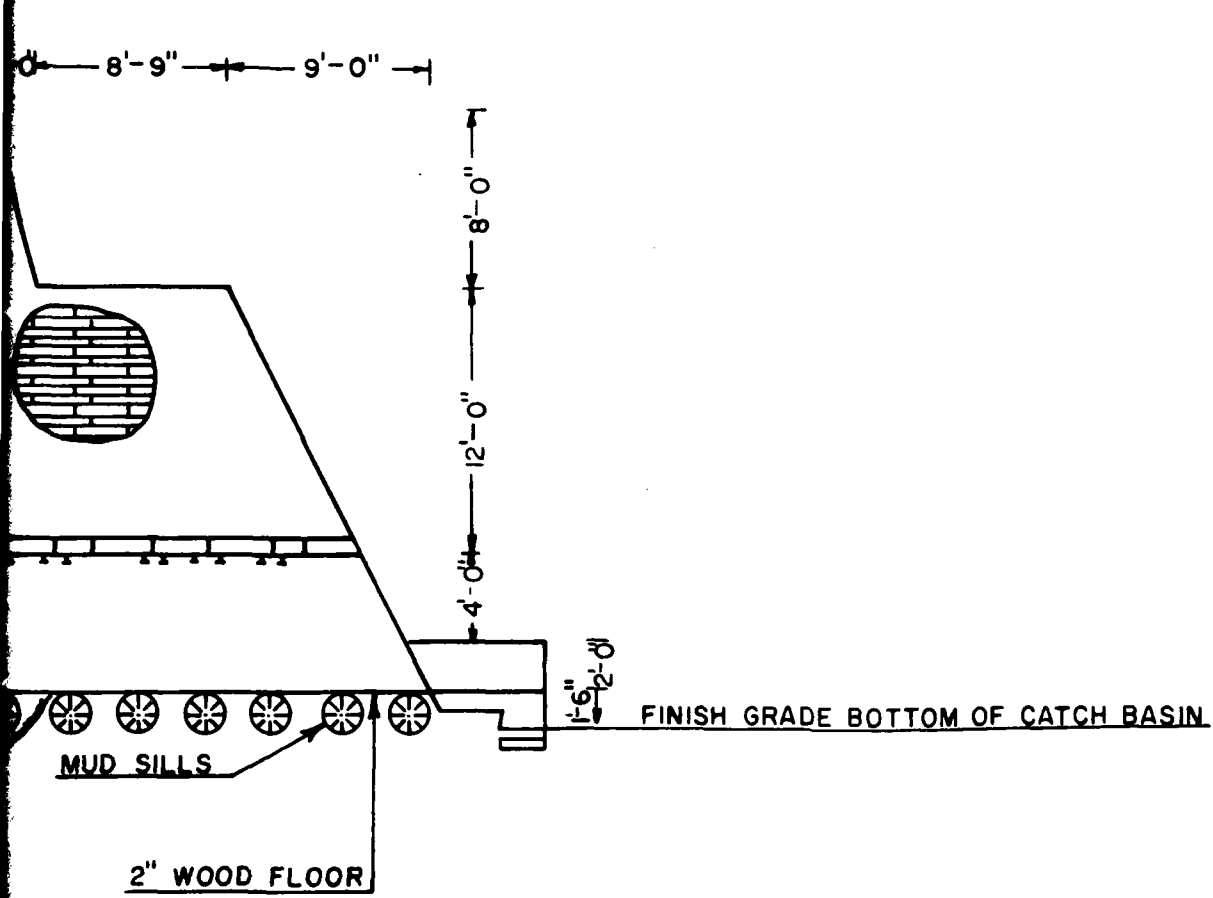








SECTION A-A SCALE



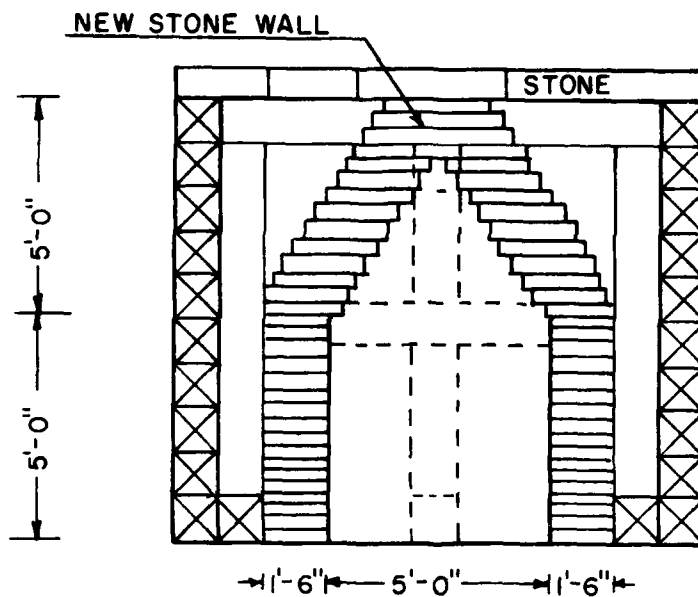
SECTION

SCALE 1/4" = 1'

2

TRACED BY BERGER ASSOC. INC.
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WH
PA.



BOTTOM OF CATCH BASIN

SECTION B-B SCALE 1/4"=1'

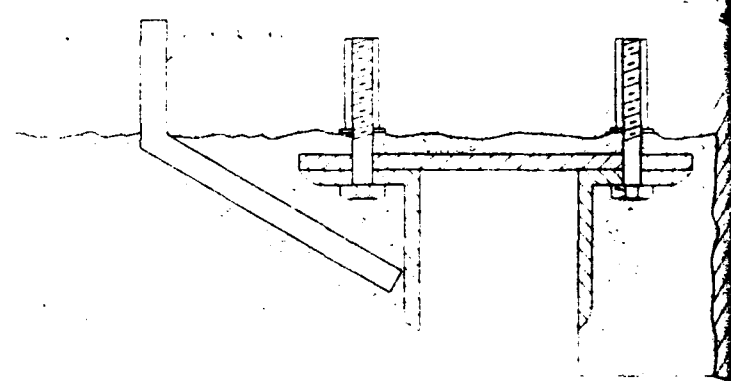
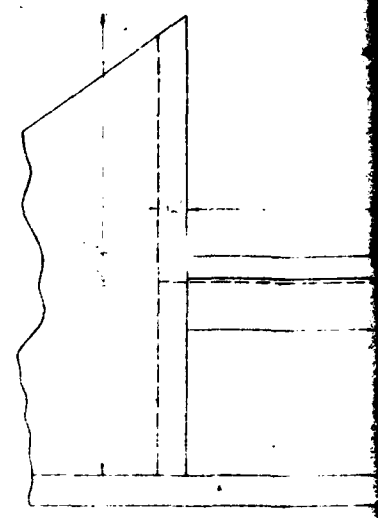
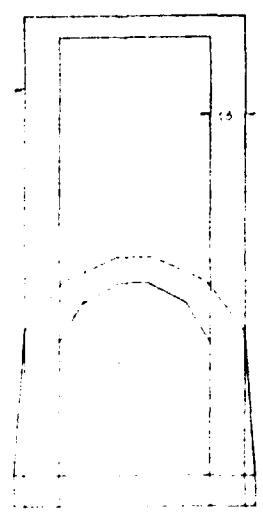
WHITE OAK POND DAM
WAYNE COUNTY
SECTIONS

3

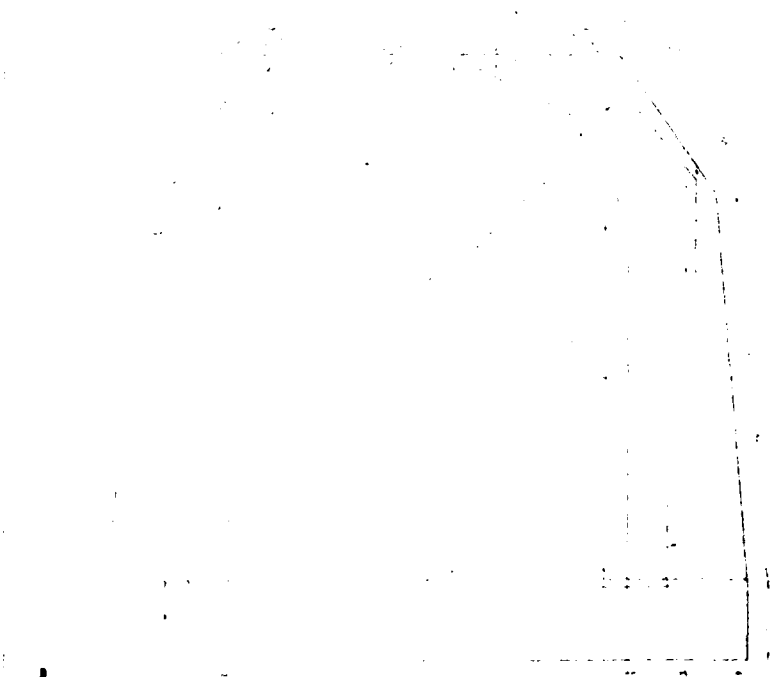
TRACED BY BERGER ASSOC. INC.
NOVEMBER 1979

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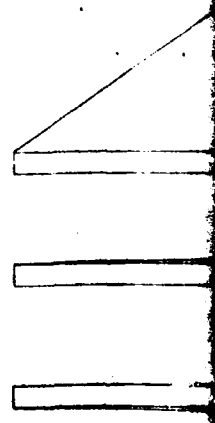
PLATE IV



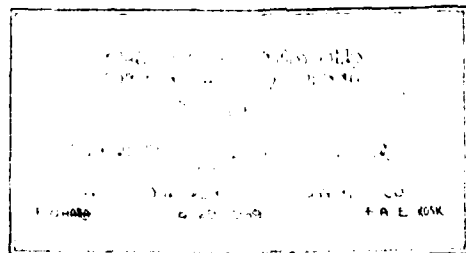
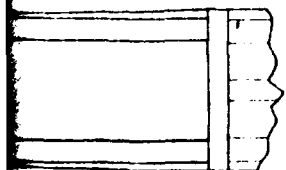
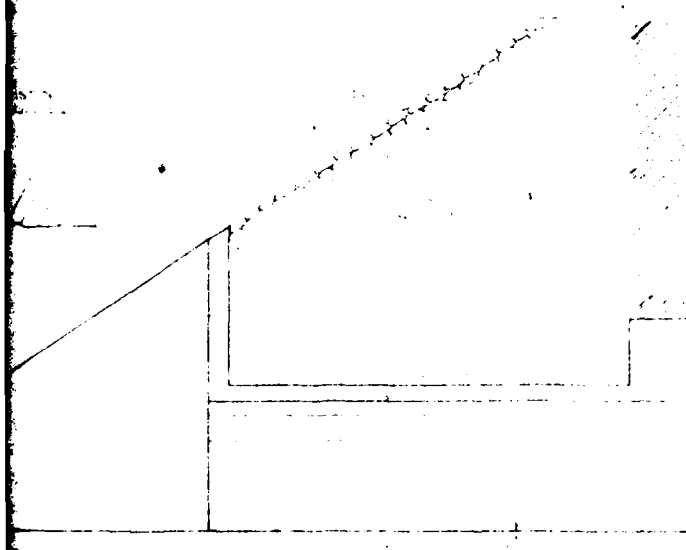
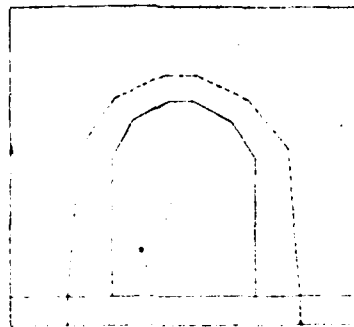
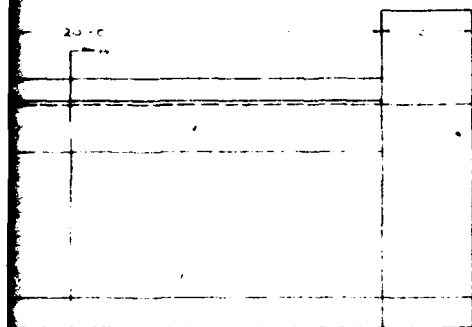
Section of the
structure showing the
beam and supports.



PLAN OF THE
BUILDING



Section of the
structure showing the
beam and supports.



2

PA-00147
PLATE V

APPENDIX F
GEOLOGIC REPORT

APPENDIX F

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Catskill Formation.

Lithology: Dark grayish-red to reddish brown shale and siltstone interbedded with greenish-gray to graying red medium grained sandstone, with some gray coarse grained sandstone. Grains of sandstones are cemented primarily with clay, iron oxides and micas. Very little carbonate present except in rare conglomeratic beds.

Structure

The dam is located on the eastern limb of the Lackawanna syncline. The strike of the beds is about N-S and they dip about 5° to the west.

Air Photo fracture traces trend N10° to 15°E.

Overburden

No drilling or other data concerning the overburden at the dam site are available. The area is within the limits of Pleistocene glaciation and variable thicknesses of ground moraine and outwash deposits can be expected. No outcrops are visible on the air photographs in the vicinity of the dam. It is possible that thick till overlies the bedrock at the dam.

Aquifer Characteristics

The Catskill Formation consists of essentially impermeable rocks. Ground water movement is entirely on bedding planes and fractures. The ground moraine is composed mostly of till, which is generally impermeable except for some discontinuous sandy or gravelly layers.

Discussion

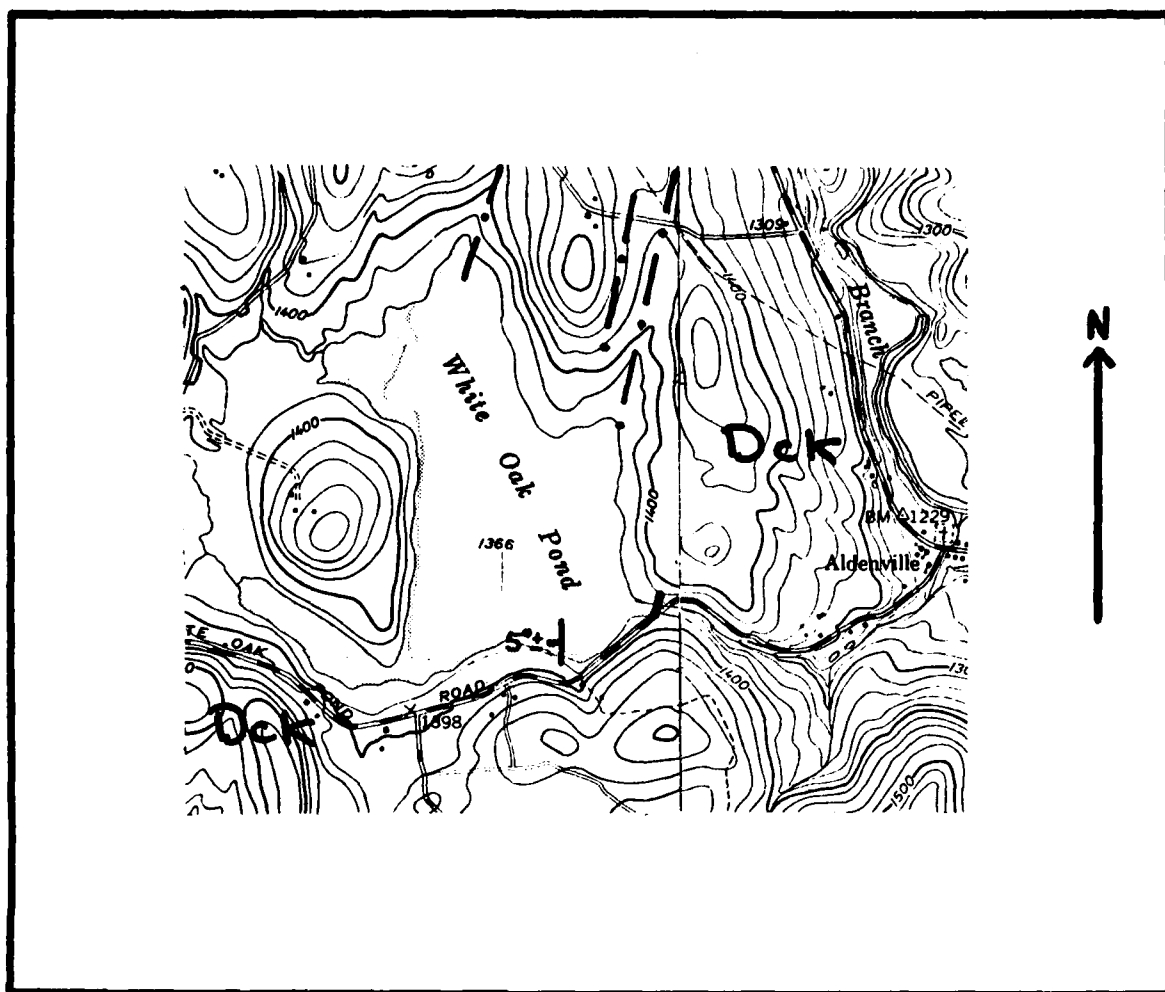
This dam was built in the 1830's and no foundation information is available. It is unlikely that the foundation was excavated to bedrock, especially since there are indications that the till is thick here.

While it is true that this dam is still standing after nearly 150 years, it should be noted that the 1969 revision of the 1949 topographic quadrangle indicates that the area of the pond was increased between 1949 and 1969, presumably by raising the outlet at the dam.

Sources of Information

1. Manuscript Geologic Map of the Forrest City and Aldenville
Quadrangles in open file, Pa. Geologic Survey, Harrisburg, Pa.
2. Air Photos. Scale: 1:24,000, dated 1969.

GEOLOGIC MAP - White Oak Pond Dam



key



Catskill Fm. - undifferentiated

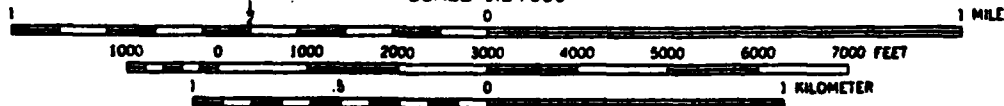


air photo fracture trace



strike and dip

SCALE 1:24,000



CONTOUR INTERVAL 20 FEET